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CONTAINING THE PROCEEDINGS OF THE COUNCILLORS AND OF THE SOCIETY.

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DELIVERED JUNE 14, 1893.

NOTE.—At an Adjourned Meeting of the Mass. Medical Society, held Oct. 3, 1860, it was

Resolved, "That the Massachusetts Medical Society hereby declares that it does not consider itself as having endorsed or censured the opinions in former published Annual Discourses, nor will it hold itself responsible for any opinions or sentiments advanced in any future similar discourses."

Resolved, "That the Committee on Publication be directed to print a statement to that effect at the commencement of each Annual Discourse which may hereafter be published."

THE MISUSE OF DRUGS IN MODERN PRACTICE.

Mr. President and Fellows
of the Massachusetts Medical Society:

The first article in the Code of Ethics adopted by this Society declares that "a physician should lend his influence to encourage sound medical education, and to uphold in the community correct views of the powers and limitations of medical science and art."

This Society has always held that education is the only source of a sound practice of the medical art. While it has fairly stated the powers of the art, it has not failed to speak of its limitations in plain and honest words.

Much as the Society has done in the past, the work is not finished. The war against ignorance and superstition is a never-ending one. This community guards its property with jealous care. The lawyer cannot practise his profession until he has passed the examination of the Court. The pilot, who brings the merchandise of our citizens safely into port, must have proved his ability before the proper tribunal. Even the drain-layer must have a license, and presumably have shown his fitness for his work.

Not so does it deal with those who profess to cure the diseases of its people. The educated

physician and the quack stand on equal terms before the law. Other states have passed laws which have driven out ignorant pretenders to medical skill. We have opened our doors to them. They have become so many and so strong as to prevent the enactment of a law to compel everyone who claims to be a practitioner of the art of healing disease to prove his knowledge of its fundamental principles. What a comment on the good sense of our community in the closing years of the nineteenth century. The man who lays a drain must have a license; the man who deals with the health and lives of its people needs none!

The only explanation of such a want of common sense in a community so intelligent as ours, is that incorrect views of the powers and limitations of the medical art still prevail. Disease is still looked upon as the result of some malign force. Drugs are still thought to be the most efficient agents to cure it. The advertising pages of the newspapers are filled with promises of cure for all the "thousand natural shocks that flesh is heir to." The mails are flooded with circulars, the streets littered with hand-bills, relating wonderful cures of diseases which have baffled the skill of regular physicians. Money is freely expended in this business by men who look for a return from their investments. That it is a profitable enterprise is shown by its growth. While it is not new, it was never so extensive or so elaborate in its methods as now. Our patients, when they

carry our prescriptions to the apothecary, see large stocks of these proprietary and secret remedies on his shelves. The great stores, where almost everything is sold, advertise "cut prices" on these goods. Grocers, even, display them by the side of articles much more tempting to the taste. How largely they are used this audience well knows.

The grosser forms of quackery which claim supernatural powers, finding their victims among the superstitious, who are not always ignorant people, I need not describe. This Society is not responsible for them, nor for the folly of those who resort to them. But when we consider the widespread belief in the community, that drugs are always useful, and generally necessary in the treatment of disease, we may well ask if we are not, in some degree, responsible for it.

Each generation is prone to think itself wiser than those that have gone before it. We admit the mistaken practice of our forefathers. We congratulate ourselves that the day of blood-letting, of mercurials, of disturbing medicines in general, has gone by. We see that faith in drugs, still so prevalent, was the lesson taught by the profession in those earlier days. Do the modern methods of treating disease justify the public in maintaining this belief?

I ask you to listen to some considerations upon the misuse of drugs at the present time; the limitations to their usefulness; and the powers of the medical art which have been gained from other sources than drugs.

It is often said that we do not give as much medicine as our fathers did. If this is true, it is not due to a want of material. We are told that Hippocrates mentions only two-hundred and sixty-five drugs in his writings.[1] The Pharmacopœia of this Society, published in 1808, includes the materia medica and its preparations and compositions in one hundred and seventy duodecimo pages. If we compare this book with the last revision of the United States Pharmacopœia, or with the last edition of the United States Dispensatory, we may well doubt the truth of the statement.

It is true that the Dispensatory includes many obsolete and inert drugs, but the list of medicines in daily use is many times longer than that of our early Pharmacopœia. Nor is it yet completed. The mineral, vegetable, and even the animal kingdoms are almost daily giving us new remedies. The chemist, by skilful synthesis, makes new compounds out of old ones. The pharmaceutist combines and offers in attractive and convenient forms the many drugs which the modern system of treatment demands.

Our drugs have gained in power as well as in number. A large part of the old Pharmacopœia of our Society consisted of drugs of little power for harm. To produce any effect, the doses were so large, and so repulsive to sight smell and taste, that the fortunate power of the stomach to reverse its muscular action often saved the patient from harm. Now the chemist has separated the active

[1] Encyclopædia Britannica, Art. Medicine.

principles of drugs, giving us agents of great power for harm, as well as for good, in doses so small as to be easily taken. The art of the pharmaceutist has made them inoffensive to the taste. Copying the wisdom of the serpent, we inject them under the skin, beyond the power of a perhaps outraged nature to reject them. The minuteness of the medicinal dose of some of these active principles would have been called almost infinitesimal by the physician of fifty years ago. There can be no question that both in the number and potency of our drugs, we are far in advance of our fathers. So far, we justify the views of the community as to the importance of drugs.

In Article V. of our Code of Ethics we read: "But a physician should lend his influence to establish a distinct line between the regular practice of medicine and the practice of quackery, and should avoid any act which might tend to weaken such a distinction either in the professional or in the public mind."

Do we observe this rule, or do we tolerate or even sanction methods of using drugs which violate it?

Until within a few years, new drugs were brought to our notice through regular channels. We read of them in reputable journals. Men, whose names gave weight to their opinions, recorded their experience of them. They were discussed in medical societies, and their power for harm as well as for good was fully and fairly stated. Pharmaceutists of good repute prepared

them, and briefly advertised their readiness to supply them. The advancement of medical science, the improvement of the medical art, were paramount considerations. The distinction between the ways of regular medicine and quackery was so sharply defined that no one could mistake them.

In these days, new customs have arisen. The pharmaceutist no longer contents himself with providing the profession with the drugs which its experience approves. He aims to direct the medical art. He proclaims the virtues of new drugs, ignoring their dangers. He vaunts the superior qualities of his own wares. Imitating the business methods of his quack rivals, he scatters his circulars broadcast among the profession, containing promises of cure and certificates of results which would do credit to the advertising agents of the rival Sarsaparillas. Let me read a specimen of the therapeutic literature which they so freely bestow upon us: "When Papoid is applied to the diphtheritic membrane, four distinct though allied effects are observed. That it seems to have a penetrating property which is exerted with such rapidity that when once really applied no amount of washing of the parts will remove it.

"That in a few hours the membranes are dissolved or detached, and do not reform, because

"The bacteria of the disease are also destroyed.

"The formation of the specific poison or 'toxalbumen' of diphtheria is arrested, and abnormal bodily temperature falls.

"The removal of the morbid growths from the throat relieves at once the embarrassment of respiration, and in a large majority of cases a complete cure is effected."

Many other useful properties of this medicine are set forth. The inferiority of pepsin is asserted. Not to be outdone by the quack, the case of a "blind ischio-rectal fistula of twenty years' standing" is related. "This case had been operated upon repeatedly, and treated by some of the best men in the country. All treatment had failed. I had operated upon and treated the case for about a year, and had given it up as one beyond my ability to manage. What I am about to state may seem somewhat startling, but it is none the less true. After proper preparation of the fistulous tract, one injection of Papoid effected a cure." Here the writer's conscience seems to have pricked him, for he adds, "At least it has been well for about two months." [1]

Having, by such means, brought us into a state of "expectant attention," he follows up his communications by a personal interview. His agents, men who have some knowledge of medicine if he can get them, enter our offices with the assurance of "drummers" in a country grocery. We are treated to long lectures on therapeutics if we will listen to them. Samples are spread upon our tables until our rooms look like the commercial travellers' apartment in a hotel. We are told

[1] Papoid Digestion, &c. Johnson & Johnson, Manufacturing Chemists, 92 William Street, New York.

of the good results their remedies will secure; that we cannot afford to be without them; that our neighbors have ordered a supply; and that, if we do not wish to be behind the times, we must also give them an order.

Leaving a sample for trial, a two-ounce bottle of cod-liver oil emulsion, perhaps, they depart, to be followed in quick succession by their rivals, who extol the virtues of their own preparations, and point out the defects of those of their predecessors.

There is one striking feature both of their literature and their lectures. Their medicines are always successful. A few days ago, I called the attention of the agent of one of the oldest firms in the country to this fact. "We have no use for unsuccessful cases," was his frank reply.

Not satisfied with copying the methods of the quack, they imitate those of the educated physician. So-called medical journals, marked sample copies, come to us with the regularity of those we pay for. They contain a few articles of merit, copied from some regular journal, but consist almost entirely of advertisements and testimonials recommending the medicines of some manufacturing firm. "A splendid remedy," "A grand combination," "I would not be without it for any consideration," "Send me a dozen bottles." Who does not know this yellow-covered literature of modern medicine?

But these enterprising business men do not stop here. Their money buys the advertising pages of

some of our best journals. Let me read some specimens of their art: —

"Ponca Compound. Uterine alterative. Exercises a specific alterative action on the uterine tissues, a general tonic influence on the pelvic organs; has a tendency to absorb plastic deposits, to regulate the vascular supply, to relieve congestion, to tone up the nerve forces, to encourage peristalsis of the bowels, and to remove spasmodic conditions. 100 tablets mailed on receipt of $1.00."

"Febricide, the only complete antipyretic of the materia medica. It sustains the patient, it reduces the temperature, it kills the fever. A restorative of the highest order. A powerful anodyne. Invaluable in malarial diseases. A positive remedy for rheumatism and neuralgia. A specific for la grippe and pneumonia. The national antipyretic."

"Dr. Borst's Pyrolignine, the new 'wood tar' product. Antipyretic, anodyne, nervine. Reduces temperature. Subdues pain. Restores nerve power. No secondary effects. A remedy of pronounced value in acute inflammatory fevers * * * and all affections in which Fever, Pain and Restlessness, alone or combined, are to be governed."

"Liqueur de Laville. A Prompt, Tried and Infallible specific for Gout in all periods of the attack. Dose, one to three teaspoonfuls daily. Professor Brown-Séquard, at a meeting of the Paris Society of Biology, October 15, 1887, said: 'Laville's well known remedy acts marvellously well in Gout, in witness of which I cite the following circumstance which occurred under my own observation. Dr. Fleury, of the French Faculty, and also author of several works on hydrothera-

py, had an attack of complete paralysis of the right side, with anæsthesia and aphasia. Precursory symptoms having appeared on the night before, he directed that in case he would be unable to read or write, a large dose of Liqueur de Laville should be given to him, provided I saw no objection to it. I assented. Two hours afterward, all symptoms of paralysis had disappeared.'"

Thinking it worth while to investigate this remarkable preparation, I wrote to the firm advertising it, for its formula. The answer was as follows: — "We are sorry to say we cannot give you the formula of 'Laville's Liquor' exactly; have been informed that it contains colchicum and colocynth; from practical experience we know it to be a very useful remedy for Gout and Rheumatism."

"Wheeler's Tissue Phosphates. * * * As reliable in Dyspepsia as Quinine in Ague. * * * It renders success possible in treating chronic diseases of women and children, who take it with pleasure for prolonged periods, — a factor essential to maintain the good will of the patient. Being a Tissue Constructive, it is the best general utility compound for Tonic Restorative purposes we have; no mischievous effects resulting from exhibiting it in any possible morbid condition of the system."

"'To lessen the fever and strengthen the heart is the first duty.'—Fothergill. Febrina Tablets lessen the fever gradually with absolute safety. Cactina Pellets strengthen the heart safely with absolute certainty."

These quotations are not taken from the Sunday newspapers, as you might infer, for nothing in

those papers exceeds them in impudent claims to marvellous powers. They are copied from the advertising pages of a single issue of the *Boston Medical and Surgical Journal.*[1]

Made bold by success in this field, one firm has thrown off the mask, and asserts its claim to lead in the art of medicine. In an advertisement in the same journal, we read: —

"In medical practice there are many 'hard questions' arising daily. The busy practitioner is settled in his own mind. Frequently, however, he has not analyzed the reasons leading to his conclusions. 'Merck's Bulletin' does the thinking, the analyzing, the proving. It gives him a reason for the faith that is in him. It covers the entire field. * * * "[2]

It is not so strange as it appears that our community does not discriminate more carefully between the educated physician and the charlatan. Such material as I have brought to your notice may be, and doubtless is, used with good effect by the quack. Laid before a committee of our Legislature, when a bill to regulate the practice of medicine is before it, I cannot wonder that the report is, "inexpedient to legislate." By tolerating such methods we endorse them, and thus violate both articles of our Code of Ethics, from which I have quoted.

As to the conduct of our medical journals we have the remedy in our own hands. It may be that the editors cannot control the advertising

[1] August 11th, 1892.
[2] September 1st, 1892.

pages. It may be that the publishers would lose money, if such advertisements should be excluded. The subscribers can make an effective protest, if they choose to do so.

Let me not be understood as condemning all advertisements of drugs, or all communications of the pharmaceutist to the physician. There are some firms whose publications are always welcome, because they are not inspired solely by the desire for gain. But there can be no question as to the evil effects of such methods as I have named.

According to Hippocrates, the medical art began with the discovery that food which is good in health is hurtful in disease. "For the art of medicine would not have been invented at first, nor would it have been made a subject of investigation (for there would have been no need of it), if, when men are indisposed, the same food and articles of regimen which they eat and drink when in good health, were proper for them, and if no others were preferable to them." [1]

Observation and experience soon led to the use of drugs. But then, as in the day of Hippocrates, and at the present time, "experience is fallacious, and judgment difficult." The great master dispelled the clouds of ignorance and supersitition which had so long hindered its progress, and placed the art of medicine on the secure foundation of accurate observation and sound deduction. He recognized the healing power of nature as the

[1] The Genuine Works of Hippocrates. Sydenham Society. Vol. I., p. 162.

corner-stone of our art. He taught the self-limited nature of many diseases. The crude humor became concocted in due season, and at fixed periods was expelled by various channels. While drugs were of use at certain stages, the critical discharge could not be interfered with safely. To remove the cause of the ailment, to put the sick man under the most favoring conditions for recovery, were the essentials of his practice of the medical art. Drugs held a subordinate place. In his reports of cases, which would serve as models for the medical writer of to-day, hardly any mention is made of treatment. Had the successors of this great man followed in his footsteps, the art of medicine would be as near perfection as our knowledge would allow.

But the inductive method was too slow in its movements. Theory soon gave birth to systems of medicine, which, ignoring or undervaluing the power of nature to heal disease, asserted the curative action of drugs. One theory flourished, soon to be overthrown by another, differing from it only in the kind of drugs, or the mode of using them. At intervals a man appeared who tried to lead his fellows into the ways of rational medicine. Sydenham revived the inductive methods of Hippocrates, and impressed upon his age the doctrine of the vis medicatrix naturæ, and the duty of the physician to follow its teachings. Again systems, the offspring of theory, pass in quick succession across the stage of history. One of these, fantastic in its conception, exceeding all others in its re-

liance upon drugs, survives and flourishes at the present day. Always having its strongest supporters among the educated classes, its success was, and is, a protest against the use of powerful drugs in effective doses, in the present state of medical science. However strongly its patrons may declare their belief in the efficacy of its infinitesimal doses, their common sense teaches them that the tenth attenuation of nux is safer than the thirtieth of a grain of strychnia.

The discourse of Jacob Bigelow, read to this Society nearly sixty years ago, and the work of Sir John Forbes on Nature and Art in Disease, marked a fresh revival of rational medicine. This Society took a prominent part in this movement. From this platform have come protests against the abuse of drugs which have an application to the present day.

For many years after this revival, the rational method of treating disease was the prevailing one in this community. As defined by Bigelow, whose discourse above mentioned did so much to establish it, it "recognizes nature as the great agent in the cure of diseases, and employs art as an auxiliary, to be resorted to when useful or necessary, and avoided when prejudicial."[1] Once more our art was brought back to the path marked out by its founder.

Of late years, the value of drugs in the treatment of disease has been asserted with increasing

[1] Brief Expositions of Rational Medicine, by Jacob Bigelow M.D., Boston. 1858. p. 27.

vigor. I have already spoken of the number of new remedies which have been brought to our notice of late years. I quote from an article on Progress in Pharmacy, by John Aulde, M. D.:—

"Alkaloids and synthetic remedies practically rule the field, and the pharmacist finds his sphere limited principally to preparing these powerful, concentrated remedies into convenient forms for administration. It has been a decade of enormous progress, and the resulting disquietude of the transition period is not yet allayed. New remedies are introduced day by day, without a sign of abatement in the inventive and creative art of the chemist. * * * It is a safe estimate to claim that one hundred new remedies of synthetic origin, which were not known ten years ago, are now in general use, and the number is daily increasing." [1]

But it is not necessary to multiply authorities. One has only to turn over the pages of our medical journals to be convinced of the truth of this statement. New remedies are announced almost daily. We read of new uses for the same remedy, new remedies for the same uses, until we wonder, as the layman must, as he reads the medical advertisements in the daily papers, that our bills of mortality are still so high.

Have we reason to believe that we have made substantial gain in our power to control disease by this great addition to our list of remedies?

It was held by Bigelow and his supporters that most acute diseases were self-limited, and could

[1] International Medical Annual, 1893. New York and Chicago. p. 565.

be influenced only slightly, if at all, by drugs. "By a self-limited disease," he says, "I would be understood to express one which receives limits from its own nature, and not from foreign influences; one which, after it has obtained foothold in the system, cannot, in the present state of our knowledge, be eradicated or abridged by art; but to which there is due a certain succession of processes, to be completed in a certain time; which time and processes may vary with the constitution and condition of the patient, and may tend to death, or to recovery, but are not known to be shortened or greatly changed by medical treatment." [1]

Nearly sixty years have passed since these words were written. With all the activity in the study of therapeutics, with all the new medicines which have been added to our list, can this definition be disputed or materially changed? Certainly not, as far as the epidemic diseases are concerned which from time to time make their appearance with such fatal results. The fatality of the recent epidemic of cholera in Europe, amounting to about fifty per cent., shows no gain in our power to control it. The same thing may be said of yellow fever. If we have made any progress in our treatment of small-pox, it has been by following the methods of rational medicine, and trying to support the patient while the disease goes through its regular succession of processes.

[1] Address on Self-Limited Diseases. Medical Communications of the Massachusetts Medical Society. Vol. V. Boston, 1836.

Diphtheria is a disease which many of us still in active practice have seen in its commencement and spread. Its average death rate of about one-third shows that no medicine has yet been found which can materially influence its course. On the other hand, when we examine the properties of many of the drugs which have had a wide use, we cannot escape the conclusion that the patient has often had to contend with the remedy, as well as with the disease. In a recent discussion in the New York Academy of Medicine, Dr. E. H. Janeway said "he had no doubt that a certain number of people, said to die of diphtheria, in reality died of the remedies given against the disease." [1]

Epidemic influenza tends strongly to recovery. Its results, immediate and remote, are determined by the constitution and condition of the patient. Various as are the drugs which have been given in this disease, good as are the results which have been claimed for them, there is no drug treatment upon which the profession is agreed as materially influencing it.

The result of the tabulation of one thousand cases of acute lobar pneumonia, treated in the Massachusetts General Hospital from 1822 to 1889, is thus stated by Townsend and Coolidge:

Twenty-five per cent. of the cases were fatal. Treatment was heroic before 1850, transitional between 1850 and 1860, expectant and supporting

[1] Archives of Pediatrics, March, 1893, p. 252.

since 1860. There is no evidence that the duration, length of convalescence or the fatality have been modified by treatment.[1]

Acute rheumatism is a disease, which if our art has not subdued, it is not for want of effort. To enumerate the drugs which have been used in this ailment would far exceed the limits of this address. More than once have sanguine hopes of a remedy been raised, soon to fade before experience. Of late years, salicylic acid and allied drugs have held the first place. It may be questioned if we have gained as much from them as many believe. These medicines relieve the pain, and lessen the fever more rapidly than any others of which we have knowledge. But relapses are more frequent than under other modes of treatment. The cardiac complications are quite as common as under any other treatment. They have no power either to prevent or to overcome the most dangerous symptom of this disease, hyperpyrexia. The duration as shown by length of stay in hospital is not materially lessened. The untoward effects of these drugs are common, often serious, sometimes fatal.[2] When we remember that these results are mainly drawn from experience in hospitals where patients are usually taken from bad, and put under good conditions, we must admit that the modern drug treatment is, at best, one of allevia-

[1] Boston Medical and Surgical Journal, January 27, 1889.

[2] A System of Practical Therapeutics. Philadelphia, Lea Brothers & Co., 1891. Vol. I., pp. 968 et seq. A System of Medicine, Pepper, Philadelphia. Lea Brothers & Co., 1885. Vol. II, pp. 51 et seq.

tion, and that this result is not gained without a considerable risk.

No drug has been found, even in the long list of synthetic medicines, which materially modifies the course or changes the result of typhoid fever. If figures are to be trusted, the only agent which may do this is cold water. If it be said that this is a drug, considering the use to which it is put, it is one which has no hurtful properties in itself, which can be safely, if judiciously, used, and which the pharmaceutist cannot utilize for purposes of gain.

The most trivial of acute diseases is coryza, commonly known as "a cold in the head." Its diagnosis is easy, its natural history well known, its local manifestations are within sight. If drugs have power to abort or shorten disease, we should find proof of it here. Belief in their power is abundant, evidence of it is wanting. The harm that has been done by attempts to influence this disease will not be questioned by any one who has seen cocaine poisoning, or has had to treat the cocaine habit. Aurists tell us that the massive doses of quinine often used may set in motion a train of pathological processes which have fatal possibilities. If we cannot do a little thing with drugs, we may well doubt our power to do a great thing. If we cannot cure a cold in the head, let us be modest in claiming the power to cure diphtheria.

Turning to the subject of chronic diseases, the name itself implies the inadequacy of our art to

shorten them. Cures for consumption have abounded in the history of medicine. Our own time has given birth to many, yet it is generally fatal. Cures for cancer, even, have not been unheard of, yet its prognosis remains unchanged.

Dyspepsia, which has been called our national disease, still maintains its foremost position, in spite of the use of pepsin (so large that some of the great meat-packing houses have found profit in putting it on the market), and the multitude of digestive ferments with which the enterprise of our pharmaceutists has furnished us. The pithy prescription of a member of this Society, long since gathered to his fathers, "drink the hundredth stroke of the pump before breakfast," and the still more comprehensive one of Abernethy, "live upon sixpence a day, and earn it,"[1] have cured more cases of dyspepsia than all the pepsins and trifermentsof the druggists' circulars.

As we turn the pages of the mass of literature on nervous diseases, a sentence from the first aphorism of Hippocrates occurs to us: — "Life is short and the art long." Studying the drug treatment of these disorders, we find little to convince us that the good it may do is not counterbalanced by its possible influence for harm.

Among the new drugs which have been brought into use of late years, those supposed to have a tonic or stimulant effect upon the heart hold an important place. In acute disease, as the heart shows supposed weakness, one, often several, of

[1] Physic and Physicians. Philadelphia, 1845. Part I., p. 98.

these powerful medicines are advised, while in diseases of the heart itself they find their greatest field of action. That they may often be of service, no one will deny. That they may do harm, no one who studies their toxic properties can doubt. That their power for good is limited is at least suggested by the fact that, since their multiplication, "heart failure" appears with increasing frequency in our certificates of the cause of death.

The numerous synthetic drugs, of which the most largely used are antipyrin, antifebrin and phenacetin, have wide applications in disease, if one may believe all he reads about them. Prof. H. A. Hare says of these three drugs, "they have relieved an amount of human misery, resulting from painful manifestations of functional or organic nervous disease, which it is not in the power of the human mind to estimate, and this, too, in most cases, without any ill effects such as follow the opiates. * * * Nor have these products proved themselves limited to any one class of cases. They have proved a perfect wonderland of useful application, and there is certainly no drug ever discovered which is so universally applicable as antipyrin, the powers of which are almost as diverse as disease itself." [1]

The young practitioner, reading this statement by a teacher of therapeutics in a leading school, must feel that a panacea is almost found. Filling his pocket-case with these drugs, he goes on his

[1] The International Medical Annual, 1893. New York and Chicago. p. 4.

way rejoicing in his power to relieve and cure. If he gives them to every patient who complains of pain, and attributes the relief to the drug, he will, for a time, be a happy man. It will not be long, however, before he meets with cases where the expected relief does not come. If he observes carefully and honestly, he will see harmful results in not a few cases. He is fortunate if he does not get thoroughly frightened by the effects of his remedies before long.

Let us examine the power of these drugs for harm. I take the facts which prove it from an essay by the same man who praises their power and safety so highly, to which was awarded the Boylston prize of Harvard University in 1890. I can give only a brief statement of the subject, referring those to the essay who prescribe these drugs without fear of consequences.

Antipyrin. 127 cases of untoward effects; 8 deaths; result not stated in 14 cases.

Antifebrin. 38 cases of untoward effects; 3 deaths; result not stated in 1 case.

Phenacetin. Three cases of untoward effects; no death.

Summing up these figures, there are one hundred and fifty-three cases in which the result is stated. Eleven were fatal, or about seven per cent. It is true that in most of the fatal cases the result was largely due to the disease for which the drug was given. It may be fairly said, however, that the chance of recovery was lessened by the disturbance caused by the drugs.

The serious character of the untoward symptoms recorded in these tables is shown by the fact that collapse, often described as "severe," "alarming," "profound," occurred in fifty cases; cyanosis in thirty-one; disturbance of the heart's action in eighteen; dyspnœa in nine; a purpuric state in seven.[1]

To determine correctly the effect of drugs in disease is one of the most difficult questions which the practitioner of our art has to meet. Experience is the source of nearly all the knowledge we have to aid us in answering it. Science has told us how some drugs, which experience has approved, produce their favorable effects; but the day of a scientific system of administering drugs has not yet arrived.

An accurate diagnosis is essential to trustworthy experience. Errors upon this point are the cause of many of the uncertain and contradictory conclusions which have been drawn from experience. Diagnosis is seldom easy, often doubtful, sometimes impossible. Having made a correct diagnosis, we must know the natural history of the disease. We cannot know the effect of a medicine in a disease unless we also know what will be its duration, the order of succession of its symptoms, and the probable result, uninfluenced by drugs. We must know the probable cause of the disease, for we cannot draw a fair inference as to the usefulness of a drug if the cause is still in operation.

[1] Fever: its Pathology and Treatment by Antipyretics, by Hobart Amory Hare, M. D., &c. Philadelphia and London, 1891.

We must also know the action of drugs upon the system iu health, and how to apply them correctly in disease. We have all these facts in very few cases; in many cases we have certain knowledge of none of them. Ignorance of any one of the factors of the problem gives a wrong answer. To assert the value of a drug in phthisis, where it has been given in a case of catarrhal inflammation of the lungs, to ascribe the improvement which nature effects at the crisis of pneumonia to the medicine given at that time, to proclaim the efficiency of drugs of which we know so little as we do of many of the new ones which are daily brought into use, are examples of the errors which make experience so fallacious. To give drug after drug, perhaps the very one which has caused the disorder, to a patient suffering from chronic poisoning by arsenical wall paper, is mortifying to the doctor and calculated to bring the art into contempt with the patient.

The constitution and condition of the patient must also be taken into account. The tendency to disease, hereditary or acquired, the power of resisting its causes, the influence of surroundings, must be known before we can judge correctly as to the influence of drugs.

Even if the mass of recorded experience was that of competent observers, the question is so beset with difficulties that the answer must be a doubtful one. But, especially of late years, those men whose opinions are most to be valued have not much to say about the use of drugs. As I

meet such men in consultation, I find that while they are careful in diagnosis, painstaking in investigating causes, attentive to the surroundings of the patient, they are cautious about advising powerful medicines. I think most thoughtful men will say that, as they grow older, they put less trust in drugs.

But much of the so-called evidence in favor of the usefulness of drugs is drawn from the reports of men whose argument is *post hoc, ergo propter hoc.* Not careful in diagnosis, undervaluing the power of nature, influenced by authority or the fashion of the day, they are always ready to try new remedies, and quick to report their supposed successes. They do not apply this argument to their failures. Often they do not report them, in which case their testimony is worse than worthless; it is misleading and dangerous. Some, too honest to conceal the truth, report their unfortunate results, but ignore the possible effect of drugs in determining them, offering some plausible explanation of them. We often read something like this: — Dr. ——— has treated twenty-two cases of typhoid fever by a certain drug, with twenty recoveries. Of the fatal cases, one was moribund when the treatment was begun, the other died of perforation of the intestine. "There are some people," says Paget, "who seem to have a happy art of forgetting all their failures, and remembering nothing but their successes, and as I have watched such men in professional life, years have always made them worse instead of better

surgeons. They seem to have a faculty of reckoning all failures as little and all successes as big; they make their brains like sieves, and they run all the little things through, and retain all the big ones which they suppose to be their successes; and a very miserable heap of rubbish it is that they retain." [1]

The average patient listens with much more interest to the prescription of his physician than to his directions about his hygiene. Expecting good results from the drug, he often imagines that he feels them. So great is the power of hope that, even in incurable diseases, a temporary improvement often follows each new prescription. This power of hope is one of the chief articles of the materia medica of the quack. It is sometimes used by the educated physician, who calls it "expectant attention." From a recent system of therapeutics I quote extracts from an article written by a professor of therapeutics in one of the leading schools of the country:

"The physician who fails to avail himself in disease of the 'expectant attention,' drops one of the most important articles out of his list of medicinal agencies. * * * When a resident physician in the Philadelphia Hospital years ago, in charge of a large ward of women, I habitually used a solution labelled 'morphine,' which contained none of that alkaloid, but just enough quinine to make it conform in taste to the knowledge of the habitués of the institution, and in three cases out of five it aided in bringing comfort

[1] Clinical Lectures and Essays. London, 1875. p. 74.

and rest, as well as did the genuine morphine solution. Some time ago, I gave a patient, with very minute and emphatic instructions as to the method of use, a prescription for pills of bread. Several months after, she came back to me and said, 'Doctor, why did you not give me that prescription sooner? It is the only thing that has reached my case, and I have had that prescription filled at the apothecary's for a number of my friends, with extraordinary results.'" [1]

The pharmaceutists give us a hint as to how far this sort of teaching has influenced our art, when they offer us the means to carry out such treatment. Within six months, the agent of a large manufacturer of "tablet triturates" offered me "blank tablets." The name he gave them will interest many of this audience. It was "Harvard Experimental Diagnosis Tablets." Setting forth their value to me from a business point of view, he told me, untruthfully I hope, that he had just sold five thousand to a physician in my own town. There can be but one opinion among honest men about this practice. It not merely weakens the distinction between the regular practice of medicine and the practice of quackery; it destroys it; it *is* quackery.

The germ theory of disease is passing beyond its first stage, and is taking its place as a real addition to the science of medicine. It has rendered great service to the art by adding to the power of preventive medicine. It has not done

[1] A System of Practical Therapeutics. Philadelphia, 1891. Vol. I., pp. 41, 42.

much for the drug treatment of disease. If it is believed that infectious diseases are caused by germs, introduced from without, the inference that drugs which kill them outside the body may destroy them after they have got in, is so attractive that it has led to many experiments in this direction. Drugs of highly poisonous properties have been largely used with this end in view. That harm has resulted from these experiments there can be no doubt. There is good reason to believe that in the hands of men who make facts suit their theories, life has been endangered, and even destroyed, by the reckless use of these drugs. No efficient and at the same time safe drug is now known which can destroy the germ within the system. The efficient germicides are dangerous, the safe ones are uncertain. It is too soon to say what advances in the use of drugs may result from the germ theory in the future. It may be that disease will yet be prevented, or even cured, by injecting substances into the system which may kill germs, directly or indirectly. It may be, to use the words of a believer in this hopeful prospect, that "the future of scientific medicine is in this direction, and that we have entered upon a field that is to be cultivated vigorously, and which will give you results that will knock the conservatism from under your feet before many years."[1] Conservatism always will be a solid foundation for the practice of medicine. The memory of tuber-

[1] Sternberg. Transactions of the Association of American Physicians. Vol. VII., p. 86.

culin is too recent to allow us to forget that a great man may reduce his theories to practice prematurely, and so shake the confidence of the public in our art.

It is my belief that nothing has done more to encourage reliance on drugs than the narrow definition which is given to materia medica and therapeutics. How restricted this definition is, is well shown by a study of the examination papers in these branches, as printed in the Catalogues of Harvard University, since the graded course in medicine was established. Of the two hundred and ninety-one questions in materia medica, two hundred and eighty-eight relate solely to drugs. The exceptions deal with articles of food. There are one hundred and sixty-four questions in therapeutics; one hundred and fifty-two deal with drugs only. Of the twelve exceptions to the rule, six are on the use of cold, one includes cold baths among antipyretic drugs, four refer to diet, while one is hardly an exception, "Course of acute rheumatism if left to itself; how can you improve upon this?"

Thus the narrow definition is perpetuated, and the student is led to look upon drugs as the most important part of these branches of the art.

In its broad sense the materia medica includes everything which can cure or mitigate disease. The Greek word from which therapeutics is derived signifies to wait on, to heal. Treated in this larger way, materia medica would no longer be, what the instructor in this department in the Har-

vard Medical School says it now is, "a most dry and uninteresting subject, which offers almost no attractions, and is, for the most part, a mere matter of memory."[1] Giving its wider meaning to therapeutics, it would include private hygiene, as it ought to do. Hygiene is the mother of our art. Medicine, surgery, obstetrics, all the specialties into which these subjects have been subdivided, depend for their successful practice upon an observance of its laws. Why should it not be given the place it ought to hold, as the source of the most certain and most effective powers we have over disease?

In a recent publication, the instructor in materia medica and hygiene in the Harvard Medical School says: "The old fashioned method of teaching materia medica and therapeutics is, or ought to be, a thing of the past. In the best continental schools these subjects are taught in a manner quite unlike that to which we in this country have been accustomed. Their teachers are not necessarily men of large medical practice. Indeed, the best of them are not practitioners at all. Their time is engaged in the study of the action of drugs and other remedial agents, and this, with necessarily more or less of their application to disease, they teach to their students, leaving by far the greater part of the practical side to the different clinical teachers."[2]

There can be no question that the subjects of

[1] Bulletin No. 4 of the Harvard Medical School Association, p. 62.

[2] Bulletin No. 4 of the Harvard Medical School Association, pp. 63, 64.

materia medica and therapeutics, even with their present limitations, have outgrown the capacity of any one teacher. So far as the physiological action of drugs is concerned, it is true that it is better taught by a man whose time is devoted to scientific work. It is a branch of physiology, and its results are as certain as those of any other branch of that science. But when the application of these laws is considered, we pass from the field of truth into the tangled paths of experience. It may be clearly proved that a drug will contract the blood-vessels of a frog; it is not so certain that it will have the same effect upon a sick man, or that, if it does, it may not hinder rather than help his recovery. It may be taught by the man of no practical experience that, in the forming stage of sthenic pneumonia, large doses of veratrum viride will remove the excess of blood in the diseased part, and by paralyzing the general vaso-motor system, bleed the patient into his own blood-vessels. He may add that when consolidation has taken place, "one grave danger is failure of power in the right side of the heart," and that "under these circumstances a cardiac depressant would immensely increase the danger."[1]

It requires the practical knowledge which comes from experience to teach that the first stage of pneumonia has generally passed before the patient is seen; that, even if the crepitant râle is heard, the deep parts of the lung may be solid; or that, if the case is seen in its forming period, and direc-

[1] System of Practical Therapeutics, Philadelphia, 1891, vol. I., p. 23.

tions are given in accordance with this theory of treatment, consolidation may occur in a few hours, and the danger of the drug be "immensely increased."[1]

The clinical teacher deals with the question of drugs as applied to the cases that come under observation at the moment. He may not touch upon drugs, which are fresh in the student's mind. His instruction must reflect his own opinions, which may differ from those of his colleagues. Great as is the advance which the art of medicine has made since clinical teaching has become so important a part of the course of study, high as is the character of this teaching in the Harvard Medical School, there is need, I think, in all schools, of a wise and experienced man to give instruction in therapeutics, and especially in the uses and limitations of drugs. He should be competent to weigh evidence, to sift the trustworthy from the unreliable, the safe from the dangerous. He should have attained the ability which Hippocrates commends when he says: "I look upon it as being a great part of the art to be able to judge properly of that which has been written."[2]

Let us now turn to the brighter side of our subject, and consider some of the great advances in the art of healing, in which drugs have had no part. The work which State Medicine has done was ably presented to this Society four years ago, by one who has won an enviable distinction in this depart-

[1] Flint. Practice of Medicine, Philadelphia, 1886, p. 156.

[2] The Genuine Works of Hippocrates, Sydenham Society, vol. I., p. 407.

ment. I shall draw my illustrations from those things that come home to us in our daily work.

The advance in knowledge that has come from modern discoveries in Biology has revolutionized the art of medicine in many of its aspects. The antiseptic method has so changed the practice of surgery and midwifery, that some most fatal diseases, which, to those of us now only in middle life, were frequent reminders of the limitations of our art, are almost unknown to the younger members of this Society.

Let us carry ourselves back in memory to the operating room of the Massachusetts General Hospital thirty years ago. It was, I suppose, as complete in its appointments as that of any hospital of the time. Its surgeons were certainly the equals, in knowledge and skill, of those of any institution of its kind. Taking off their coats, from motives of economy, certainly not of cleanliness, the surgeons put on the garments reserved for their work, which had hung in a dark closet since they were last used. Stained and stiff with the blood of scores of patients, they were worn, perhaps, with something of the pride which a veteran soldier feels in the uniform that bears the marks of many a hard fought field. Instruments were taken from the cases, and used without further preparation. Sponges were washed in plain water, and used from case to case. Hands were washed in soap and water only. The patients were removed to the wards, to be a source of anxiety to the attendants until their wounds were healed.

That this anxiety was justified the records of the Hospital will amply prove. One of those surgeons, in the annual address to this Society twenty-nine years ago, thus describes what happened after operations: "I remember the time, when after an amputation, or the excision of the breast, or a large tumor, it was the universal rule to bring the edges of the cut integuments together nicely with straps, compresses, and a bandage, with the full assurance of finding the wound nearly healed on the removal of the dressings. At the present day, however, such a result is rarely attained in city practice; union by first intention being, for the past twenty years, the rare exception."[1]

I need not draw the picture of the operating room in the same hospital to-day. You are all familiar with it. The son of the man who wrote the words I have just quoted would tell you that the exception in 1864 has become the rule in 1893.

The use of dangerous drugs as disinfectants, and in protective dressings, was considered a necessary part of antiseptic treatment in its early days. Great harm, and even death, resulted from their use in no inconsiderable number of cases. Now antisepsis has given place to asepsis. Heat has largely supplanted poisonous drugs, and the treatment of wounds has become much simpler and safer, and has lost nothing in efficiency. I will not weary you with illustrations of cases to

[1] Recent Progress in Surgery, by J. Mason Warren, M.D. Medical Communications of the Massachusetts Medical Society, vol. 10, No. 4. Boston, 1864.

which the surgeon of to-day brings healing, where the physician of thirty years ago stood helpless, happy if he could give his patient an easy death.

The statistics of lying-in-hospitals, since the importance of cleanliness in midwifery practice was accepted by the profession, show how great a saving of life has resulted from the discovery of this truth, which was made and announced by Semmelweis in 1846.[1] In the wards of the Vienna hospital in which students had their clinical teaching in midwifery, the mortality averaged nearly ten per cent., while in those to which only midwives had access, it was less than four per cent. Semmelweis connected this difference in mortality with the fact that the students handled dead bodies, while the midwives did not. The discovery was made, the remedy was applied. The students were directed to wash their hands in chlorinated water before entering the lying-in wards. The mortality fell from over twelve per cent. to less than four per cent. in six months, and later to less than two per cent. The principle of aseptic midwifery was found out. Its only advance has been in its details. Chlorine still maintains a high rank in the list of modern germicides. The profession was so blinded by theory that these facts, so plain that we wonder they were not at once accepted, were lost sight of. The literature of puerperal fever grew. The treatment by drugs was always ineffective, while the real cause was lost sight of in the many theories of its nature

[1] London Lancet, October 29, 1892.

with which the books abounded. Semmelweis died before the truth of his discovery was recognized. Now, it is proposed to build a monument to his memory as the founder of aseptic midwifery.

While we accord all honor to the man who found out the cause of puerperal septicæmia, and told us how to prevent it, we should not forget that an honored member of this Society first brought before the profession facts which should have opened its eyes to the truth. More fortunate than Semmelweis, he lives to see the correctness of his views acknowledged by all. In 1843, Oliver Wendell Holmes published his essay entitled "Puerperal Fever a Private Pestilence," in which he cited many cases showing that this disease had often followed the path of individuals, while their neighbors did not meet with it. He stated its infectious nature. He declared that a physician should cease to attend cases of labor if puerperal fever occurred in his practice; that he should not go from an autopsy to the lying-in chamber, and that he should keep himself scrupulously clean in his dress and person. These views were violently opposed by some, doubted by most, acted upon by a few. To show how theory sometimes treats facts when they happen to oppose it, I quote from the essay the words of Prof. Hodge of Philadelphia: "The result of the whole discussion will, I trust, serve not only to exalt your views of the value and dignity of our profession, but to divest your minds of the overpowering dread that you can ever become, especially to women under the extremely

interesting circumstances of gestation and parturition, the minister of evil; that you can ever convey, in any possible manner, a horrible virus, so destructive in its effects, and so mysterious in its operations, as that attributed to puerperal fever."[1]

Let us narrow the illustration to one disease. Not many in this audience can go back in memory to the time when croup was supposed to be a single disease. The sudden and noisy attack, which strikes terror to the mother's heart, and summons the tired doctor from his first sleep, was looked upon as the early stage of what we know as membranous croup. All cases were subjected to the same treatment—bleeding, mercury, antimony were freely used. Hive syrup was a domestic remedy, which still survives in the Pharmacopœia under the name of Compound Syrup of Squill. If the patient lived, drugs got the credit. If he died, friends were comforted by the assurance that nothing had been left undone. That it would have been well if much had been left undone, no one who has seen a child in the collapse of antimonial poisoning will question.

More than fifty years ago John Ware published his investigations on the natural history of croup. He showed that at least four diseases had been included under this name. One was so insidious in its onset that it seldom came under the notice of the physician until it was well advanced. Its diagnosis was not difficult. In almost all cases it

[1] Puerperal Fever as a Private Pestilence, by Oliver Wendell Holmes, M.D. Boston, 1855.

could be determined by the presence of exudation in the throat. It was very fatal, and the treatment then in vogue certainly did no good, and probably did harm. A second form resembled the first in the character of the voice and respiration, but was distinguished from it by the absence of false membrane, and its almost certain recovery. The other forms, alarming in their early symptoms, had no exudation in the throat, and got well under simple treatment.[1] Time has confirmed these results, and bleeding, mercury and antimony are things of the past in the treatment of croup.

Time will not allow me to pursue this subject further. The gain which our art has made from increased knowledge of the natural history of disease cannot be overestimated. It has overthrown false and harmful methods of treatment, not by substituting others equally erroneous, but by leading us on to the solid ground of truth.

I have brought to your attention some of the ways in which, as I believe, we fail to uphold in the community correct ideas of the powers and limitations of the medical art. I have tried to set forth some of the limitations to the usefulness of drugs, and to point out the great advances which have followed a better knowledge of the natural history of disease. Let me not be understood as denying the good which drugs may do as aids to nature. The practice of our art would be dreary indeed if we were wholly deprived of them. But

[1] Contributions to the History, Diagnosis and Treatment of Croup, by John Ware, M.D. Boston, 1850.

that the great activity of the chemist and the pharmaceutist in these days is leading us away from the right path, I am convinced. The history of medicine is full of illustrations to confirm me in this belief.

It needs no argument to prove that the public does not judge our art correctly. Nor is it true to say that ignorance is the only cause of this false judgment. The public is neither ignorant nor unintelligent in most matters affecting its welfare. It is well to ask if we are not responsible, in some degree, for a state of things which we cannot fail to recognize. These words of John Bell may have an application to the present day: "I have also observed, that where there exist any very singular prejudices connected with our profession, they have first arisen among the profession, though now perhaps they are to be found only among the vulgar; and when there have been ill reports among the vulgar concerning the practices of medical men, they are seldom entirely void of truth."[1] What, then, can we do to correct the false views of the powers and limitations of the medical art which still prevail?

We should teach that disease is not caused by the laws of nature, any more than the injury that the artisan sustains from the breaking of a scaffold is caused by the law of gravitation. The law is beneficent; the harm comes from violating it. If we could live in perfect harmony with the laws of

[1] The Principles of Surgery, by John Bell. London, 1826. Vol. I., p. 16.

nature, it is not unreasonable to say that disease would be unknown, and the end of life as natural and as painless as its beginning. This ideal condition can never, perhaps, be reached, but just as far as we have made progress towards it has disease grown less. We have not, and never shall have the power to change the laws of health, but we can increase our knowledge of them, and declare the absolute dependence of our art upon them.

Sure as is the penalty of the violation of nature's laws, there is one upon which our art securely stands. It is well stated by one of our great surgeons in these words: "After a part has been changed by disease, it tends naturally to regain a perfect state."[1] Certain in its action as is this law, plainly as its working may be seen in disease, it is not fully appreciated, even in the profession. It is not strange that the public should have incorrect views of it. Recounting the advances of modern surgery, a recent writer speaks of the old practice of leaving ruptures of the abdominal viscera to the unaided efforts of nature, and contrasts it with the resources of modern surgery, quoting Billroth as saying that the *vis medicatrix naturæ* is a better physician than surgeon.[2] With equal reason might we blame nature if she failed to cure a case of pneumonia left uncared for in the street. Nature, not the surgeon, heals the wound. The old surgeon could cut as skilfully, and sew as deftly, as the surgeon of to-day. Ignorance of

[1] Paget, Surgical Pathology.

[2] Rivington, London Lancet, April 1, 1893, p. 713.

nature's laws tied the hands of the older man; a better knowledge of them enables the modern surgeon to remove the obstacles from her path.

From the standpoint of the physician, the argument still holds good. Experience proves how little we can control disease by drugs. The results of modern study point out clearly the way by which we may hope to prevent it, or to aid nature in her attempts to cure it.

We believe we have discovered in a bacillus the cause of consumption. If the seed falls into good ground, it brings forth fruit. If it falls upon stony ground, it withers away. How hopeless a task it is to utterly destroy the seed, a glance at a microscopic slide of tubercular sputum will convince us. How to make the soil infertile is the problem we have to solve.

If the seed falls into good ground and brings forth an hundred fold, we still can see the working of the healing power of nature. She tries to wall off the diseased from the healthy parts. She throws off the tissues which the disease has killed. She closes the vessels which the process of destruction threatens to lay open; she tries to close the gap which is left, and she does not cease her efforts while life remains. Sometimes she succeeds in arresting the disease, and a study of these fortunate cases indicates the way our attempts to aid her should follow. The most sanguine believer in drugs will find little in this study to strengthen his faith. Pure air, good food, all things included under the name of hygiene, are the only agents in which we can put our trust.

The Cambridge Hospital has wisely chosen for the motto on its seal these words: "Man tends, God mends." The truth they express will only be made clearer as science advances towards perfect knowledge.

The wise general never fights on the ground his enemy has chosen, if he can avoid it. The quack takes his stand on the power of drugs to cure disease. Here he is strong. He can use the argument of *post hoc ergo propter hoc* more effectively than the educated physician. Restrained by no considerations of truth or humanity, his promises of cure are marred by no ifs and buts. We cannot wonder that the public, comparing his ways with ours, and finding the points of likeness I have described, should so often choose the broad way he offers, rather than the narrow way which rational medicine indicates as the only path to health.

Every man, says Bacon, owes a debt to his profession. It is given to few to be the discoverers of great truths, but the humblest of us may do his part to raise our art to a higher level. Let us give to drugs their proper subordinate place, using only those which experience has proved to be safe. Let us do all that in us lies to aid nature in her work. Slow to accept praise for our successes, let us study our failures with candid minds, and report them honestly, that others may learn from them. So shall we lend our influence to uphold in the community correct views of the powers and limitations of medical science and art, and to make

clear the distinction between the regular practice of medicine and the practice of quackery.

In thus discharging the debt due our profession, we shall best fulfil the duty we owe our patients. The relation of the physician to his patient is a sacred one. The sick man puts his life in our hands. He follows our directions without question. We have no more right to experiment upon him with a doubtful drug, without his knowledge, than the surgeon has to perform an operation without his consent. The law protects him from the operation he does not consent to; the moral law alone guards him from the drug which may be more dangerous than the surgeon's knife. "The first great law in therapeutics is, to do no hurt."

And finally, to use the words of Jacob Bigelow, "the importance and usefulness of the medical profession, instead of being diminished, will always be elevated, exactly in proportion as it understands itself, weighs justly its own powers, and professes simply what it can accomplish. It is no derogation from the importance of our art that we cannot always control the events of life and death, or even of health and sickness. The incompetency which we feel in this respect is shared by almost every man upon whom the great responsibilities of society are devolved. The statesman cannot control the destinies of nations, nor the military commander the event of battles. The most eloquent pleader may fail to convince the judgment of his hearers, and the most skilful pilot may not be able to weather the storm. Yet

it is not the less necessary that responsible men should study, deeply and understandingly, the science of their respective vocations. It is not the less important for the sake of those whose safety is, and always will be, committed to their charge, that they should look with unbiased judgment upon the necessary result of inevitable causes. And while an earnest and inquiring solicitude should always be kept alive in regard to the improvement of professional knowledge, it should never be forgotten that knowledge has for its only just and lasting foundation, a rigid, impartial and inflexible requisition of the truth."[1]

[1] Medical Communications of the Massachusetts Medical Society, Vol. V. Boston, 1836.

ARTICLE II.

THE SHATTUCK LECTURE.

TUBERCULOUS PLEURISY.

By WILLIAM OSLER, M.D.
OF BALTIMORE, MD.

DELIVERED JUNE 13, 1893.

TUBERCULOUS PLEURISY.

Mr. President and Fellows:—

Many members of your ancient and honorable body (Bowditch, Wyman, Ellis, Garland, Sears and others) have dealt with many problems in connection with pleurisy; and without making invidious comparisons it may be said that their contributions, more particularly those of the late Henry I. Bowditch, are the most important which have been made on the subject in this country. While modesty made me hesitate to select any question relating to pleurisy as the topic for the Shattuck Lecture of this Society, I felt that differences of opinion on many points—not the least on those concerning the frequency, varieties, and sequences of the form known as tuberculous—would justify the narration of an experience gleaned during the first four years of service in the medical wards of the Johns Hopkins Hospital.

I. Incidence of tuberculous pleurisy in the post-mortem room and in the wards.

(a) In the post-mortem room.—A trustworthy estimate of the incidence of tuberculous pleurisy can be had only by anatomical investigation. Uncertainty is inherent to clinical records of an affection such as pleurisy, the diverse etiological factors of which cannot be always discriminated at the bedside, even with the help of bacteriology.

Accordingly, with the kind assistance of Dr. Rupert Norton and with the consent of my colleague Prof. Welch, I have carefully analyzed the post-mortem records of the 101 successive cases from my wards in which pleurisy—fibrinous, sero-fibrinous, hæmorrhagic, or purulent—was found; and

the record is of interest as showing the incidence of tuberculous pleurisy in a medical service varying from 70 to 90 beds. Of the 101 cases, there were 32 in which the pleurisy was definitely tuberculous. I have estimated as such only those in which tubercles were present on the pleural layers, either as fresh miliary granulations, caseous masses, or diffuse fibro-tuberculous membranes. Of these cases there were eight with purulent exudate, all associated with pneumothorax, and two with hæmorrhagic fluid. Seven were cases of acute miliary tuberculosis with fibrinous and sero-fibrinous exudate; four were instances of acute miliary tuberculosis with a purely fibrinous effusion; and thirteen were cases of chronic sero-fibrinous exudate with more or less thickening of the pleural layers. In four instances the sero-fibrinous exudate was encapsulated.

There were thirteen cases of pulmonary tuberculosis in which pleurisy was present without our being able to say definitely that it was of a tuberculous nature. In ten of these cases the exudate was fibrinous, and three sero-fibrinous. It will thus be seen that the incidence of tuberculous pleurisy among these 101 cases was a little less than 32%. By far the most common forms of pleurisy are the sero-fibrinous and fibrinous secondary to acute disease of the lungs, or occurring as a terminal process in chronic affections of the heart, arteries, or kidneys.

(*b*) *In the wards.*—Passing now from the certain and definite data of the post-mortem room let us turn to the wards and inquire into the etiology of the cases of acute pleurisy which have been under observation. I have thought it better to review only those cases in which there has been a pleurisy with effusion coming on acutely or sub-acutely, and in which the effusion was sero-fibrinous, not simply fibrinous and not purulent. I have excluded the former from analysis because of the very great frequency, as the post-mortem reports show, of a simple fibrinous pleurisy in

so many varied conditions, often overlooked clinically, of which, of course, tuberculosis is one, indeed one of the most common. I have not included the purulent cases, partly because there is here much less dispute, as they have a more definite and well-recognized etiology, and partly from the fact that abscess of the pleura—empyæma—is regarded with us as a strictly surgical affection, and the cases are either admitted directly to the surgical wards or turned over at once. This may account for the somewhat remarkable absence of purulent pleurisies in the post-mortem records of cases from my wards, apart from the instances of pneumothorax. Still it must be noted that of 14 cases of empyæma operated upon, 12 recovered, exclusive of the cases of empyæma with pneumothorax. The cases in the following analysis, then, have been admitted to the wards with well marked signs of pleurisy with effusion. Of the 58 cases 45 were males; 13 females; 10 were in the colored race; 48 in the white.

In attempting to estimate from the clinical side the tuberculous character of a pleurisy the following points are to be considered:

First: mode of onset. In reality this is not a criterion of any moment, since it must be acknowledged that an acute tuberculosis of the pleura may come on abruptly with a stitch in the side, or even with a chill. A slow insidious onset is more common, but by no means characteristic.

It is so difficult to obtain from hospital patients accurate information as to the mode of onset, often indeed as to the duration of their illness before admission, that we cannot place very much reliance upon the facts so obtained; but the errors, I suppose, are equally common throughout the entire class. As a general rule, too, the patients do not seek relief until the symptoms have become aggravated. Thus it is interesting to note that in the 58 cases of serofibrinous pleurisy the duration of illness prior to admission

was given as one week and under in 8 cases; between one and two weeks, 16 cases; between two and three weeks, 7 cases; one month and over, 25 cases.

Of the symptoms for which they sought relief the following were the most striking: In two cases no history could be obtained. Of the remaining 56 cases the symptoms for which they sought relief were as a rule cough, dyspnœa and pain in the side; more rarely fever or chills and fever. Thus in 45 cases the patient complained of cough; in 44 of dyspnœa; in 41 of pain in the side; and in 14 there was a history of chills and fever. Cough and dyspnœa are by far the most frequent causes for which the patient seeks relief in hospital. In two only of the cases did the patient gave any definite account of an exposure to cold or of a wetting. As stated, the onset is no etiological criterion, and the claim at present is that a great majority of the cases of pleurisy *a frigore* are in reality tuberculous. In the history obtained from the patient, however, there may be very suggestive features; for instance, cough and loss of weight for some months previous, or hæmoptysis, or a previous attack of pleurisy. Thus, one patient, Case 1 of the series, had had a cough at intervals for three years, and when admitted the right side of the chest was full of greenish, sero-purulent fluid. After many tappings he improved very much, and, though the cough had persisted for so long, there was no sign of pulmonary disease, but subsequently bacilli were found in the expectoration. Another interesting case, No. 4, had hæmoptysis nine months before, and though he was an extremely robust, vigorous man, the insidious onset of the pleurisy led us to suspect tuberculosis. Bacilli were demonstrated in the exudate. The patient subsequently developed pulmonary tuberculosis. In two instances only the patients had pleurisy with effusion previously; in one five months before; in the other eight years before. Both did well, and both were discharged at the end of three weeks.

A second point, on which more stress has been laid than the facts justify, is the family history; but inheritance is now generally acknowledged to be of a susceptible soil, rarely of the germ itself. Local conditions are probably of most importance in influencing the susceptibility to an infectious agent so widely disfused as that of tuberculosis. Still it is interesting to note the presence or absence of tuberculosis in the ascendants or near relatives; thus in two of the fifty-eight cases the father died of tuberculosis; in four, the mother; in one, the father and mother; in six, a brother or sister; in one, a brother and sister; in four, an aunt or uncle; and in two the wife died of tuberculosis, in one the husband. In 37 of the cases positive questions as to tuberculosis in the family were answered in the negative, and in three it could not be obtained.

Third: the character and contents of the exudate. There is nothing specific in the physical characters of the effusion in tuberculous pleurisy, nothing from which on aspiration a definite opinion can be formed. The exudate may be sero-fibrinous, simply serous, hæmorrhagic, sero-purulent or purulent. Of these the hæmorrhagic and the thin sero-purulent may be called suggestive. Of the cases of acute pleurisy with effusion at the clinic seven were blood tinged. Of the cases from the wards in which pleurisy was found post-mortem, in four the effusion was hæmorrhagic; of these two were tuberculous and two were simple. The thin sero-purulent exudate, a little opalescent, often with a greenish tint, and which microscopically contains a granular, fatty matter and only a few leucocytes, is very suggestive of a tuberculous lesion. The cover-slip and culture tests, so much practised of late, yield variable results. In the first place it is conceded that the great majority of tuberculous sero-fibrinous effusions are sterile; organisms are neither found on cover slip preparations nor does anything grow in cultures. Our own experience is in accord with

this, except that in one case the tubercle bacilli were definitely determined in the exudate. This was after repeated tappings. A sterile effusion is regarded as a point in favor of the tuberculous nature. In the purulent tuberculous exudates the bacteriological results are also variable. In some of the acute cases, as in one which I shall describe shortly, the bacilli of Koch were abundant. In other instances only pus organisms or the diplococci are present, or there may be no micro-organisms. A more important and more satisfactory test is the inoculation of the exudate into the peritoneal cavity of guinea pigs, experiments which in the hands of some of the French observers have yielded positive results in the sero-fibrinous and purulent pleurisies of individuals apparently not tuberculous.

When Koch's tuberculin was in vogue it was hoped that it might at any rate give us a means of positive diagnosis. The report of the German hospitals shows that in the subjects positively tuberculous the great proportion of them present reaction, whereas in suspected individuals about 60 per cent., and in non-tuberculous subjects only about 25 per cent. Subsequently, in speaking of diagnosis I will narrate an instance in which the acute reaction to tuberculin led us into a serious error in diagnosis.

And lastly, the nature of the pleurisy may not be apparent for months or years, when the onset of a tuberculosis in other parts may indicate clearly the character of the whole process. You are all familiar with the striking statistics published of late years, none more interesting than those by Dr. Vincent Bowditch from his father's records. Such statistics from private practice are of infinitely more value, as a rule, than those from hospitals. The time has been altogether too limited at the Johns Hopkins Hospital to determine, even if we could, the subsequent history of the great proportion of the cases of sero-fibrinous pleurisy which have been under treatment. It is interesting to note, however,

in striking contrast to figures from some hospitals, that so far as our records go, only five of these patients have subsequently had tuberculosis. While our hospital figures are by no means in favor of the view that a large proportion of all sero-fibrinons pleurisies are of a tuberculous nature, I must confess that in private practice I have, year by year, been increasingly impressed by the frequency with which the subjects of pleurisy with effusion subsequently become tuberculous. Such cases as the following are not uncommon.

A few months ago I saw Dr. Martinet, a man aged 40, of fine physique and general good health, and excellent family history. In the summer of 1892 he developed, without obvious cause, pleurisy on the right side, and in this attack was seen on several occasions by Dr. W. S. Thayer. He was aspirated twice and made a very satisfactory recovery, and resumed his work. Three months subsequently he developed basilar meningitis, of which he died in three weeks. There was nothing in the condition of this patient or in the character of the pleurisy to justify the suggession of a tuberculous nature, but the onset of a meningitis which ran a long course like the tuberculous form, with strabismus, etc., rendered pretty clear the nature of the process. A very similar case I remember in the practice of my late colleague, Dr. Ross of Montreal. A young man was admitted with pleurisy on the left side and the history of having had a previous attack several months before. The effusion gradually diminished, but signs of local disease developed at the apex of the right lung. About three months after admission a purulent otitis media developed on the left side, followed shortly by meningeal symptoms, of which he died in the third week. The autopsy showed greatly thickened pleural membranes on the left side, many tubercles and local tuberculous disease at the right apex, with a tuberculous basilar meningitis.

I have seen recently a young man with an advanced pul-

monary tuberculosis, who consulted me first in Philadelphia in October, 1888, when he had the left pleura full to the clavicle with a serous exudate. There is no tuberculous history in his family. The disease set in insidiously with cough. He was tapped but once, and he rapidly gained health and strength. I did not see him again professionally until the autumn of 1892, when he had had attacks of severe prostration and shortness of breath, but very little fever. Since then, signs of local disease have developed and extended, and tubercle bacilli are present in the expectoration. Cases such as these could be paralleled from the note books of any physician in large practice. The cases from the wards which have developed pulmonary tuberculosis will be described later.

II. Clinical Types.

Tuberculous pleurisy may be part of a general miliary infection, but it is rare to find the pleuritic symptoms dominating, or even pronounced enough to attract attention. In reviewing any large number of cases, the character of the onset and the quick or slow course offer the most valuable features for classification, and separate two types, to which may be added a third, when the pleurisy forms part of a general serous membrane tuberculosis.

1. *Acute Tuberculous Pleurisy.*

It is difficult to say, in our present state of knowledge, the proportion of instances of acute sero-fibrinous pleurisy due to tuberculosis. The cases are rarely fatal; a large majority recover completely, in a few the condition becomes chronic, a variable number develop tuberculosis. More than this we cannot say, but clinical and anatomical study enable us to separate at least three groups of tuberculous cases in which the onset is acute.

(*a*) *Acute tuberculous pleurisy, with subsequent chronic course.*

There are cases of tuberculous pleurisy in which the disease sets in abruptly with pain in the side, fever, cough, and sometimes with a chill. There may be nothing whatever to suggest a tuberculous process; the subject may be of fine physique and of excellent family stock. Nor may there be anything in the course of the disease at first to excite suspicion. The effusion augments and the patient is tapped, perhaps repeatedly, and may get well with evidences of a greatly thickened pleura. Then the pleurisy may recur, and the case is labelled one of chronic pleurisy with thickening of the membranes, and finally the lung is infected, or tuberculosis of other parts becomes manifest. The following is a good illustrative case, of special value from the fact that the death occurred from an intercurrent affection, and we were able to study the condition of the pleura just about a year after the onset of the first illness.

Case 1.—Pleurisy, with acute onset; chronic course of nearly a year's duration; repeated tappings; acute pneumonia; death; autopsy.

John A., aged 45, was admitted to ward F of the Johns Hopkins Hospital, June 18th, 1892, complaining of shortness of breath and swelling of the feet and legs.

His mother and four or five of her sisters died of phthisis.

When young had (he was told) scrofula, and had an operation performed on both hips; the wounds discharged for two years. He was not then, nor has been since, at all lame. Ten years ago he had hydrocele on the right side, which was tapped. After childhood he grew into a remarkably strong, powerful man. Previous to January, 1892, he had been working in the Belt-line tunnel for nine months, and was in perfect health, weighing 235 pounds. He went

to Virginia, and while there, in January, his present illness began. While at work on a bridge he felt dizzy, had a severe pain in the left side, followed by cough, shortness of breath, much expectoration, which was not, however, blood tinged. He went to a hospital in Washington, and was told he had typho-pneumonia. He had high fever, and was evidently very ill. The feet were swollen, and he had at times heavy sweats. He was several months in hospital, and was convalescent only about a month before his discharge on June 2d. He does not give a very clear account of his symptoms while in the hospital at Washington, but he had cough and pain in the side, and he lay principally on his right side. He lost also a great deal of weight.

Condition on admission (by Dr. Thayer): Patient is a large framed, muscular, fairly well nourished man. He is propped up in bed, inclining chiefly towards the left side. Lips and mucous membranes of good color; respirations rapid, 32; pulse, 128, regular, tension rather high; radial vessels are somewhat sclerosed. Temperature on admission, 99°; weight, 175 pounds.

Inspection. Thorax; the left side looks larger and movements are much restricted. The cardiac impulse is seen to the right of the sternum.

Percussion gives clear resonance in the right front as far as the third rib, where, close to the sternum, in the fourth and fifth interspaces, it becomes flat. On the left side there is modified resonance below the clavicle, shading into absolute flatness at the second rib, in the erect posture; at the third rib when recumbent. The flatness extends over the whole of the left back. Tactile fremitus is absent over the flat region, and the breath sounds are distant and tubular. On the right side they are clear, loud and breezy. The heart sounds are heard best to the right of the sternum, and are clear, the second loud and sharply accentuated.

Examination of the abdomen was negative. The urine was clear, yellow, acid, faint trace of albumin, no casts. The patient was aspirated, and 1500 cc. of a clear, yellow serum withdrawn.

For the first month in hospital the patient's condition did not materially improve. He lost in weight from 175 pounds to 157; the temperature range was constantly between 98.5° and 100°, rarely going to 100.5°, and only once, on the second day after his admission, reaching 101.5°. The fluid gradually re-accumulated, and he was tapped on the 21st, with a withdrawal of 1280 cc. of fluid; on the 30th, when 1000 cc. were withdrawn; and on July 8th, when 1100 cc. were removed. Early in July he began to improve,—the appetite increased, and he gained in weight. On the third of August the following note was made: "The patient has been aspirated in all six times, the last time being on the 26th of July. On inspection, there is now very marked flattening of the left front. The expansion is greatest on the right side, on which percussion note is full and clear. On the left side there is flat tympany above the second rib, below absolute flatness. Over the flat areas there is a distant, tubular breathing, of almost the same intensity everywhere. The vocal fremitus is diminished. The breath sounds very nearly absent in the supraspinus fossa." He was aspirated the seventh time on August the 3rd, with removal of 800 cc., and the eighth time on August 16th, when 600 cc. were removed; the fluid of the last four tappings was blood-tinged. In the latter part of July and the first two weeks in August he improved rapidly and gained in weight, and on the 16th weighed 175 pounds.

The patient was discharged on August 18th, when the following note was made: "The left side of the chest seems somewhat sunken; right side expands fully and well, and looks large. At the left apex there is a flat tympany, which

shades into flatness at the fifth rib, just outside the nipple line. At the left back there is a marked dulness, becoming absolute about an inch below the angle of scapula. Above this point the vocal fremitus is felt, below it is absent. Respiration is heard, though feebly, everywhere except at the extreme base. The point of maximum cardiac impulse is not to be made out; the sounds are heard distinctly over the normal area; the second pulmonic sound is accentuated."

The diagnosis of pleurisy with effusion was made. No suspicion was entertained by Dr. Thayer, under whose care he came during my absence, that the process was tuberculous; indeed, there was no evidence whatever to indicate this, except that the last four tappings were slightly blood tinged.

November 30th, 1892. Patient was re-admitted to-day with dyspnœa, cough and fever. He states that he has remained well since discharged, August 18th, and has been working on the streets ever since. Three weeks ago he had slight shortness of breath after an unusual exertion, and ever since that has had slight cough with white, frothy expectoration. He worked every day until November 26th. Last evening he had a heavy chill, in which he shook for an hour. This was followed by fever, which persisted all night. This morning he spat up a little blood. His appetite has been good.

Condition on admission. Weight is 170 pounds. Temperature, 100.4 at 2 P. M., rising to 103° at 4 P. M. He had a profuse sweat in the afternoon, and the temperature fell to 98° at 6 o'clock. Pulse ranged from 80 to 120; respirations from 18 to 36.

December 1st. This morning patient is lying on his back, face somewhat flushed, lips and mucous membranes and finger tips somewhat cyanotic. Pulse 104, full, of fair tension. Respirations 32. There is marked flattening

in the left side in front; the right side of the chest expands fully. Resonance throughout the right front and axilla, good. There is marked dulness over the left chest, resonance in front having a slight tympanitic quality. There is dulness everywhere over the left chest behind, shading into flatness below the middle of the scapula. On the right side behind, the resonance appeared good, and the respirations were clear. On the left side behind, the breathing was distant, tubular, and in the infrascapular region scarcely audible, vocal fremitus distinct. Dr. Hewetson put in a needle in the left back and obtained clear fluid.

Heart; well marked epigastric impulse. The maximum impulse cannot be made out. The sounds are the best heard in the fourth interspace, 4 cm. from the sternum. The spleen is not palpable; liver not enlarged.

The sputum not very abundant, muco-purulent, blood tinged, contained a few distinct tubercle bacilli, and many encapsulated diplococci.

The urine, reddish brown, sp. gr. 1025, moderate amount of albumin, no tube casts.

December 3d. Within the past 24 hours the signs of consolidation have appeared in the right side, and have extended rapidly. This morning dulness begins at the third space in front, and is marked to the middle of the back behind. The breathing is of a modified, tubular character, and accompanied with fine crepitant rales. The temperature rose throughout December 1st, and between 6 A. M. and 4 P. M. of the 2d was continuously between 105° and 106°. For the past 24 hours the range has been between 103° and 104°. The pulse range has been from 106 to 120. The cough has been very distressing. The sputum is rusty, brown, tenacious, and contains tubercle bacilli. On the evening of to-day a moderate venesection was practised.

December 4th. The dulness has extended on the right

side behind, and there is now tubular breathing from the spine of the scapula to the base; pulse is good; the temperature fell last evening to 101°; this morning it is high again, 104°. The respirations are about 40. There is marked leucocytosis, 33,000 white corpuscles per cubic mm. During the day patient sank gradually, the pulse becoming feeble, in spite of the persistent administration of stimulants, ammonia, etc.; the temperature kept up, and he sank, and died at 2 A. M.

Autopsy (Dr. Flexner). Body of a large framed, well nourished man. Peritoneum smooth. Thorax; universal adhesions, which were readily stripped off on the right side. On the left side dense fibroid union of the layers of the pleura to a distance of about 8 cm. from the sternal margin. The heart much distended, with firm gelatinous clots; moderate hypertrophy of the left ventricle, distinct hypertrophy of the right, the walls of which were firm and considerably thicker than normal. No endocarditis.

In removing the left lung an encapsulated serous effusion was opened, occupying the layers of the pleura over the postero-lateral region of the left chest. The costal pleura was greatly thickened, ranging from 1 to 1.5 cm.; at the diaphragm, it was in places as much as 2 cm. in thickness. The visceral layer was also thickened, but not to the same degree, only from 3 to 5 mm. Both layers were smooth, greyish white in color, in places presenting areas of congestion and hæmorrhage. There was a good deal of greyish white gelatinous fibrin in places, closely adherent to the visceral pleura. There were no caseous masses, no spots of caseous infiltration on the surface of either layer. On section, the thickened pleura had the appearance and consistence of firm, new connective tissue, and at first sight it seemed as if the process were really a simple chronic pleurisy, more particularly as no miliary tubercles were noticed on the surface, and no caseous masses. On close examination,

however, of the cut sections, particularly in places, greyish translucent fibroid tubercles could be seen projecting above the cut surfaces. These were particularly marked in the thickened diaphragmatic layers. At one or two spots there were found small areas, from 3 to 5 mm. in extent, of greyish, yellow tuberculous infiltration. The left lung was very considerably compressed, but still it everywhere contained air, except at the extreme base. There were no miliary tubercles, no caseous masses. The right lung was large, voluminous, retained its shape, did not collapse, and was everywhere airless, except at the extreme apex, and the antero-lateral margin. The pleura was a little thickened, and covered with tags of old adhesions; no tubercles were seen. On section there was at the apex an area of caseation and softening the size of a walnut, surrounded with tubercles and smaller areas of caseation. This communicated directly with a good-sized bronchus. The lower part of the upper lobe, the greater part of the middle lobe, and all of the lower lobe, were in a condition of rēd hepatization. There were no miliary tubercles, no caseation. The bronchial and tracheal glands were greatly swollen, tumefied, and presented here and there small caseous masses. There was nothing of special note in the abdominal organs; no tubercles. In the right testicle there was a fibroid and cartilaginous, cyst-like structure containing cholesterin.

There was a marked tuberculous history in the patient's family, and the latter tappings were blood tinged, points upon which in a less robustly built man we would doubtless have laid greater stress. On his return with an acute pneumonia, tubercle bacilli, as well as pneumococci, were found in the sputum, and the former gave us, for the first time, a definite clue to the nature of the pleurisy, now chronic but in process of healing. It is interesting to note that the tubercle bacilli came from a very small focus of caseation and softening in communication with a bronchus.

(b) The secondary and terminal acute tuberculous pleurisy.

Here reference is not made to cases of general miliary tuberculosis in which the pleural membranes are involved with other parts. A miliary eruption is very often secondary to a local tuberculosis in the lung, and under these circumstances the exudate is usually fibrinous. It is interesting to note that in the 101 post-mortems from my wards, in the cases in which tubercles were found on the membranes only four had a simple fibrinous pleurisy. On the other hand, there were eleven instances of fibrinous pleurisy in persons dead of pulmonary tuberculosis in which there was no mention made of tubercles on the pleura. This accords with the well known experience that a pleurisy in the course of a pulmonary tuberculosis is not always due to the presence of tubercles. Acute miliary tuberculosis of the pleura, with a sero-fibrinous or hæmorrhagic exudate, was present in only seven of the autopsies. In every one of these cases the tuberculosis was secondary to some other affection, or occurred as the terminal event in some long standing illness. Whether or not in an instance, for example, of acute pleurisy with effusion, coming on in an apparently healthy individual, and which, for the sake of argument, we may presume to be tuberculous, the condition of the pleura is that of an acute miliary tuberculosis, I have no personal knowledge; but in my experience the condition has almost invariably been, as just mentioned, a secondary or terminal process in some already existing affection. The following are illustrative cases: In the first instance there was a chronic anæmia, induced by the hæmorrhoids, with old foci of caseous disease at the apices of the lungs. The death resulted from miliary tuberculosis, involving chiefly the pleural sacs.

Case II.—Hæmorrhoids; anæmia; chronic tuberculosis; caseous foci in the lungs; acute miliary tuberculosis of both pleural membranes.

R. S., male, white, aged 47, admitted October 21st, 1891, complaining of bleeding piles. He has always been a healthy man; never has had any illness, except the hæmorrhoids, which have troubled him at intervals for nine years. During the past few weeks they have been much worse, and he has lost blood with every stool, having had three or four evacuations every day. He says that he has lost as much as a pint of blood at one time. He has gradually become very pale. At present the hæmorrhoids are not bleeding.

Patient is a pale but well nourished man. On admission, the examination of the lungs was negative; the heart impulse was diffuse. The pulse was regular, small in volume. The spleen was not palpable, and there was no œdema. The urine contained a faint trace of albumin, but no tube casts. He was thought to have moderate grade of anæmia from bleeding piles.

About the middle of November the patient began to be delirious, but the temperature was not high, not more than 100° or 100½°. He had slight diarrhœa, from three to six semi-solid stools daily. He did not seem very ill, and was generally up and about and dressed, though he talked in a rambling, incoherent way.

About November 28th he began to have dyspnœa, which gradually increased. The temperature had not changed specially since his admission; had been ranging from 100° to 101.5°, and very rarely reached 102°. On December 3d the note was that he was propped up in bed; very pale; lips and mucous membranes blanched; respiration 32, labored and wheezing. Pulse 120; chest hyperresonant in front; dulness at both bases; below the angle of scapula an

absence of breath sounds. There was no expectoration. He continued to have three or four loose stools daily, and died on the 5th.

Autopsy. Large, well built, well nourished man, marked anæmia. Peritoneum is smooth. Over the mesentery, and the lower surface of the diaphragm, and in the pelvis, there are numerous elevated, translucent tubercles, some of them surrounded with areas of hyperæmia. The peritoneal surface of the intestine also presents numerous tubercles. The surface of the spleen and the contiguous diaphragm presents many tubercles.

Acute miliary tuberculosis of both pleural sacs, with about two litres of serous fluid in each. The membranes were covered with a thick, fresh fibrinous exudate, after the removal of which many miliary tubercles were seen. Both lungs were compresseed; no cavities; but at the apices there were old and partially softened caseous masses, with many miliary tubercles. In the lower lobes there were only few scattered tubercles. The spleen presented a few tubercles; no tubercles seen in the liver.

Intestines. One or two small ulcers, with irregular margins, in the ileum. The mesenteric glands hard and caseous.

Meninges were œdematous, but presented no tubercles.

In the following instance the patient died of an acute entero-colitis, with an acute miliary tuberculosis of the pleura as a terminal event.

Case III (abstract).—*Chronic entero-colitis; acute tuberculosis of the left pleura.*

Jos. A., aged 33, colored, admitted January 23, 1891, complaining of diarrhœa and colic. There was no history of tuberculosis in his family. He had gonorrhœal synovitis five years ago, and a chancre. For nearly a year he has been subject to diarrhœa. On admission, patient was

emaciated and anæmic; afebrile. The physical examination was negative. He had four or five stools daily, yellowish white in color, and containing undigested food; no amœbæ were found. He was very anæmic, had moderate fever, temperature range from 99° to 101°. The diarrhœa was uncontrollable, and he gradually sank, and died on February 28th. There was found an extensive enterocolitis, chiefly of the large bowel, with irregular ulceration. Almost the entire costal pleura on the left side was the seat of an extensive eruption of miliary tubercles, quite fresh, with hæmorrhagic zones about them, and much fibrinous exudate. These fresh adhesions extended along the diaphragmatic surface. The bronchial glands were caseous. There were no lesions in the lungs, except at the edge of the lower lobe, adherent to the diaphragm, there was a firm caseous mass, with some induration about it and colonies of miliary tubercles.

Post-mortem, we certainly see acute miliary tuberculosis of the pleura most frequently in the bodies of persons who have been under treatment for some chronic malady, affections of the heart and arteries, chronic Bright's disease, or scleroses of various sorts. Usually there will be found in these cases old foci of tuberculous disease, a caseous nodule at the apex, or in the bronchial glands, or in the mesenteric glands. Of late attention has been called repeatedly to the association of tuberculosis of the serous membranes, most commonly of the peritoneum, with cirrhosis of the liver; but a number of instances of terminal tuberculosis of the pleura have also come under my care in this disease, and it may exist without having caused symptoms enough to attract attention. In one of my wards at Philadelphia Hospital an elderly man, with cirrhosis of the liver and moderate ascites, and dulness at the right base, died suddenly of hæmorrhage from the stomach. The effusion on the right side, which we thought to be hydrothorax, as

it had come on without any special aggravation of the symptoms, proved to be acute miliary tuberculosis, with effusion. More frequently the symptoms are pronounced, as in the following case:

Case IV.—Fatty and cirrhotic liver; hæmorrhage from the bowels; bilateral acute tuberculous pleurisy.

Mrs. L., aged 27, admitted with hæmorrhage from the bowels and tenderness over the region of the liver, which organ was slightly enlarged. There was no jaundice. She was a hard drinker, and had been in failing health for some months. Signs of pleurisy were discovered on both sides, and she had a severe cough. She sank rapidly, and died within a week or ten days after her admission.

Autopsy.—Left lung covered with a thin fibrinous exudation, thickest at base and near the edges. In places the membrane is studded with minute granular tubercles, which are best seen where the exudation is less abundant. The organ is crepitant throughout, a caseous spot is seen at apex, and a narrow fibroid area in the lower lobe. No disseminated tubercles throughout the substance. The right pleura presents a similar exudation, less abundant than on the left side. The costal pleura is thickly lined with false membrane, is congested, and presents small grey bodies scattered through the membrane. At the apex of the lung is a small caseous mass, with a cavity the size of an almond, in direct communication with a bronchus. In the neighhorhood of this are several small groups of tubercles. The lower lobe also presents a couple of small caseous bodies, but no scattered tubercles. Liver weighs 2,200 grammes, is large and pale. Lobules distinct, bile-stained in centre. Organ is both fatty and cirrhotic. Other organs normal.

Such instances as the following are not rare in old hos-

pital patients with cardio-vascular and renal changes. More than once I have mistaken a terminal tuberculosis of the pleura for hydrothorax.

Case V.—General arterio-sclerosis; primary tuberculosis of right pleura.

Joseph A., aged 70, colored, laborer, admitted July 26th, 1892, complaining of shortness of breath and swelling of the feet. No family history to be obtained. His wife states that he has been a perfectly healthy man all his life. She never heard him say that he had any illness. With the exception, some years ago, of a gathering under the left arm, he has been perfectly well. He denies the use of alcohol to excess.

His present illness began suddenly four weeks ago with a shaking chill, which lasted about half an hour, and was followed by pain in the stomach and shortness of breath. He has had no return of the chills, but has complained of abdominal pain. Two weeks ago the legs began to swell, and he thinks the abdomen was also slightly swollen. For about the same length of time he has been a little irrational. There has been slight cough, and he has had to sit up in bed to sleep.

Present condition.—In bed, lying on the left side. He is somewhat emaciated; respiration rapid, 48; pulse 136, easily compressible, radials calcified; temperature 101°, rose in the night to 102.5. He is not rational, and constantly mutters to himself.

Thorax.—Resonance throughout the right front is good, but rather tympanitic; in the upper left front it is full, and somewhat tympanitic in character. Respirations everywhere accompanied by an expiratory groan, and in front they are harsh, and there are occasional râles, which, on the left side, are medium-sized. Behind the resonance is impaired at the right base, clear on the left side; on both

sides respiration is harsh, and accompanied with fine, moist râles. Heart impulse is in fourth, fifth and sixth spaces; maximum in sixth, 3 cm. outside the nipple line. Relative dulness at third rib. Sounds are feeble and heard with difficulty.

Patient was taken home August 11th; the dilatation of the heart had subsided under the use of digitalis. He had slight diarrhœa, which was checked with alum enemata. The signs of engorgement in the lungs disappeared, and he had no pulmonary symptoms. The case was regarded as one of hydrothorax, secondary to the dilated heart in chronic arterio-sclerosis. Death occurred about two weeks after he left the hospital.

Autopsy (Dr. Flexner and Dr. F. R. Smith)—(*Abstract*).—The patient was found to have general arterio-sclerosis, with hypertrophy of the heart. The pericardium was smooth. The right pleura was thickened and the pleural layers uniformly adherent. The costal membrane measured about 4 mm. in thickness, and was covered with tubercles, somewhat larger in size than miliary granules, and, as a rule, caseous. The underlying thickened infiltrated tissue was yellowish, and consisted of a diffusely caseous mass. The outermost layer was more fibrous. The pleura covering the diaphragm was greatly thickened and infiltrated. The lung was somewhat compressed, deep salmon color, and contained no tubercles. The left pleura was not especially thickened; no adhesions. There were small miliary nodules, however, on the visceral layer. The apex of the lung was somewhat retracted, and on the anterior edge of the upper lobe there was an area of caseous pneumonia, with a small central cavity. There were, however, a few scattered tubercles throughout the posterior part of the lung.

(*c*) *Acute tuberculous suppurative pleurisy.*

A considerable number of the purulent pleurisies, designated as latent and chronic, depend upon tuberculosis, but the fact is not so widely recognized that acute ulcerative and suppurative disease, of a most severe type, may occur and run a very rapid course. In the following remarkable case the disease attacked a young, healthy woman, of good family history, and set in abruptly with a chill and severe pain in the side. On admission there was dulness in the right side, feeble breathing, but there were features about the physical examination which made us a little uncertain as to the nature of the case, and nothing was obtained on several aspirations. Within a few days, however, it seemed so clear that suppuration must be going on that Dr. Halsted was requested to operate. Instead of finding any large collection of pus, there were small pockets varying in size from a marble to a chestnut and though portions of ribs were resected in three different places no large collection was found. The symptoms persisted, and death took place about five weeks after the onset of the illness. Remarkable ulcerations were present throughout the right pleura, with pockets of pus between the adherent layers, no large accumulation, and an extensive acute miliary tuberculosis of the lungs. The tubercle bacilli were present in large numbers in the pus. Full details of the case are as follows:

Case VI.—Suppurative tuberculous pleurisy; numerous pockets of pus; operation without benefit; miliary tuberculosis of lung.

Lizzie W., aged 21, German by birth, was admitted to ward *G*, April 7th, 1893, complaining of chills, fever, and pain in the right side.

Father and mother living and well; one sister living; no history of hereditary disease in the family.

She has always been a perfectly healthy girl. Has been

in service; has only been in this country a short time. She had erysipelas of the head and face some months ago, and has not been quite so well since. She was seen by Dr. Salzer, who found signs, he thought, of effusion at the right base, with high fever, and he ordered her removal to the hospital.

Present trouble began, she says, fourteen days ago with pain in the right side and fever. She had a chill about six o'clock, and a had a sweat at night. The pain was of a dull character, and much aggravated on drawing a deep breath. There was no cough. The fever, pain in the side, and sweating have been the chief symptoms throughout her illness. She has been unable to work since its onset. The appetite is poor, and she has lost considerably in weight.

April 8th. Present condition. — Small framed, well nourished young woman. Lips and mucous membranes of a good color; tongue slightly coated. Temperature on admission was 101°; this morning, at 10 A. M., it was 102.5°; pulse 88; respirations 28. Chest is well formed; good costal angle; both sides expand well, the right much less than the left.

On percussion there is flatness on the right side from the fourth interspace in parasternal line; from the fifth rib in mammillary line; from the sixth in anterior axillary line. At the back there is flatness below the angle of the scapula. The breath sounds are clear in the infra-clavicular region, and as low as the nipple. Below this, behind and in front they are feeble, though clear. Behind, over the flat areas, respiration is feeble and distant. The vocal fremitus is absent over the flat areas. There seems to be a slight movable dulness at the level of the nipple in front. The cardiac impulse is in the fourth interspace in normal position. The sounds are clear, and of normal relative intensity. The abdomen is negative. The liver dulness reaches to

the costal margin; the border was not palpable, and there is no pain on deep pressure. The urine is whitish yellow, acid, 1020; no albumin. It was thought probable that the case was one of empyema, and on the 10th an exploratory needle was inserted in the fifth space in the anterior axillary line, but nothing was obtained. The temperature range during the next week was very irregular, reaching sometimes to 104° or 105°. She had chilly feelings and heavy sweats at night.

On the 11th the following note was made: Pulse 130, regular, soft; she is propped up in bed; respirations are quiet. Patient lies somewhat on the right side. The left side of the chest moves freely. On percussion and palpation there is great tenderness over the sternum, particularly at the third right interspace and at the sternal end of the fourth costal cartilage. The line of dulness begins at the fourth space at the sternum, and passes through the nipple. The flatness extends across the sternum. Lower border of the liver is not palpable, but the flatness extends in the nipple line to costal margin. The respiration above the line of flatness is clear, below feeble, distant, and difficult to hear. Vocal fremitus, while practically absent in front, is to be felt in the axilla. In the back the line of flatness has not materially changed from that noted on entrance. On auscultation, as one approaches this line, there are fine, moist râles on inspiration, which are increased by coughing. The apex beat of the heart is not dislocated outward.

An exploring needle was again introduced; this time at the eighth space below the angle of the scapula, but with a negative result.

On the 12th the temperature was 105°; the pulse this morning was quieter, only 80 to the minute; tongue was not dry. There was to-day extreme sensitiveness along the right margin of the sternum, particularly in the third and

fourth interspaces. The blood count gave over 5,000,000 red to the cubic mm., and 18,000 white corpuscles.

It seemed evident that there was suppuration going on in the chest, and it was thought most likely to be an empyema, possibly diaphragmatic. The possibility also of a subphrenic abscess was considered, though this did not seem to be very likely, as the liver was not depressed. The points which made the case somewhat dubious were the extent of dulness and signs of effusion without marked dislocation of the heart apex, and without anything like a typical line of dulness and not of movable character. The absence of fluid also, on aspiration with a good-sized exploring needle, suggested that there was something unusual.

The case was transferred to the surgical department, and on the 13th Dr. Halsted operated.

Under ether an attempt was made to find the abscess cavity by means of an exploring needle, which was thrust into the right side of the chest in several places, where dulness was marked. Then a portion of the fourth rib over the painful spot was excised, and only a small pocket of pus found; portions of the sixth and of the eighth ribs were also removed, but only small areas of suppuration within the pleura were seen. The wounds were stuffed with gauze, discharged for a time freely. Tubercle bacilli were extraordinarily abundant in the pus. The patient died early on the morning of May 8th.

Autopsy (Dr. Barker).—Body somewhat emaciated. Scars of the incisions mentioned above, and two of them had slight sinuses. On making the preliminary median incision pus oozed from beneath the skin over the sternum. On stripping back the skin, fistulous sinuses were seen close to the edge of the sternum in the second, and third, and fourth interspaces.

Thorax large; costal angle wide. Right pleural cavity has been largely obliterated, the visceral being intimately

adherent to the costal pleura; both layers greyish white in color, thickened and infiltrated. Over the lower lobe it is in places fully 2 cm. in thickness, and it is adherent to the diaphragm. Tubercles have grown through the diaphragm and appear on the peritoneum. On this diaphragmatic surface of the pleura there are a number of abscesses filled with greenish pus and cheesy material; the walls are lined with necrotic tissue. In front, between the pleura and the diaphragm, corresponding to about the seventh costal cartilage, there is a large recent abscess the size of a hen's egg, which has infiltrated the diaphragm and made an ovoid indentation on the surface of the liver. Several of these intra-pleural abscesses exist along the spine, and have eroded slightly the bodies of the vertebræ. Here and there over the surface of the middle and upper lobes, between the layers of the thickened pleura, are recent abscesses, varying in size from a marble to a walnut. The whole lung is thickly studded with a minute miliary and sub-miliary tubercles, grey and translucent.

On the left side there are no adhesions, and beneath the pleura there can be seen a few minute miliary tubercles, which are thickly set throughout the lung substance. The pleura is not at all thickened. The bronchial glands are somewhat enlarged, deeply pigmented, and thickly studded with tubercles. The pericardium presents a few small miliary tubercles; no exudation. There is a small miliary tubercle on one leaflet of the mitral valve. The spleen is enlarged and soft, weighs 445 grams, and presents many miliary and sub-miliary tubercles. The same are present throughout both kidneys. In the ileum, Peyer's patches are reddened, and in some there are minute greyish white and yellowish white miliary nodules. The mucous membrane of the ileum, just above the valve, is completely studded with tubercles. Some are softened and breaking down, and there are slight superficial losses of substance.

The mesenteric glands are somewhat enlarged and hyperæmic. There are also pale yellow areas. The glands along the aorta are enlarged, and many of them caseous. The glands along thoracic aorta are also enlarged and caseous. The cover-slips from the pus in the pleura show large numbers of tubercle bacilli. Agar Esmarch's tubes, made from the pleural pus, spleen, liver and kidneys, remain sterile.

2. *Sub-acute and chronic Tuberculous Pleurisies.*

There are two groups of cases, with effusion, and the chronic adhesive form, the former being by far the most numerous.

(*a*) *With sero-fibrinous effusion.*

The process may be primary, or, at any rate, most extensive in the pleura, or secondary, to manifest tuberculosis of the lungs.

The primary constitute an extremely important division of the tuberculous pleurisies, and here may be reckoned a not inconsiderable number of all the cases of the insidious form. The true character of the disease is frequently overlooked, and indeed for a long time there may be nothing positive on which to base a diagnosis. Though we speak of the disease as primary in the pleura, in almost every instance there are tuberculous foci in the lungs or in the bronchial glands, or the process has extended from the peritoneum. Frequently the cases are admitted to hospital with acute manifestations, but with advanced pleural lesions, evidently of long standing, ante-dating the pulmonary tuberculosis. The following are illustrative cases:

Case VII.—Bilateral tuberculous pleurisy; acute tuberculosis.

Henry W., aged 43, admitted July 29th, 1891. Rather

more than a year ago, patient was in hospital for jaundice, and was discharged well. He returns complaining of cough, and shortness of breath. He states that his present trouble began about four weeks ago; he woke up in the night with shortness of breath; has had chilly feelings, though no rigors, and had felt very weak. He has had some cough, very little expectoration, no pain; no œdema of feet. He does not think that he has lost any in weight. Temperature on admission was 102°; the following morning 103°; pulse 128; respirations 36. The urine is dark yellow in color, clear, no albumin; Ehrlich's reaction not present.

The chest is broad and deep, expansion fair, a little more on the left than on the right. Percussion is clear on the right side at the apex, and to the fourth rib; below which there was impaired resonance. On the left side a clear note to lower border of second rib; dulness from the second to the fourth, and from the fourth rib in axilla there is flatness. Defective resonance over the central portion of the lung behind, and flatness at the base. In the left lung there are numerous rales at the apex, with pectoriloquy, and behind distant tubular breathing. Breath sounds are almost absent at the left base. On the right side there is flatness at the base, with distant tubular breathing. Effusion was suspected at both bases, and he was aspirated in the eighth right interspace behind, and a small amount of hæmorrhagic effusion found. On the following day he was aspirated at the eighth left interspace behind, and a few cc. of fluid (hæmorrhagic) removed. The sputa contained tubercle bacilli. The temperature was high, from 103° to 104½°. He became delirious, had rapid breathing, blueness of the finger tips developed, and the pulse became much enfeebled, 130, and he died on the morning of February 4th.

Autopsy (Dr. Councilman).—Large, well-developed, well-nourished man; circumference of the thorax in nipple line 93 cm.

Left pleural cavity partially obliterated by old adhesions, especially at the apex and posteriorly. The remainder of the cavity filled with about 300 cc. of turbid, yellow serum with flakes of fibrin. Both layers of the pleura much thickened by a new grey vascular tissue, and covered with a gelatinous fibrin. There are many opaque white nodules beneath the membranes, and the thickening is marked. The layers can be peeled off as a continuous membrane, and beneath them can be seen opaque yellow and grey miliary tubercles. The right pleural cavity presented old adhesions only at the base, and it contained 350 cc. of serofibrinous fluid, the surfaces covered with fresh grey fibrin; the pleura and the membranes slightly thickened.

The pericardium was smooth; heart presented nothing abnormal.

Lungs.—At the apex of the left lung there is an irregular cavity measuring 3 by 5 cm., the tissue about it in a condition of gelatinous and tuberculous pneumonia. There are clusters of tubercles and miliary granulations scattered throughout the rest of the lung. The right lung presents a few scattered miliary tubercles without any very large areas of consolidation.

A few fine miliary tubercles were found in the kidneys; mesenteric glands presented a few small tubercles.

The condition of the pleura here ante-dated evidently the more acute onset of his final illness, and he was probably the subject of a latent tuberculous pleurisy, followed by a general infection.

Case VIII.—Chronic tuberculous pleurisy with effusion.

E. S., male, aged 31, colored, admitted January 12th, 1891, complaining of cough, pain in the right side, and dyspnœa. He has had cough at intervals for a year; no hæmorrhage. About Christmas of last year he got very

much worse, and since then has had high fever, night sweats, dyspnœa, and abundant expectoration. His family and personal history are good.

He is well nourished; face, lips, mucous membranes and finger tips are cyanosed. Temperature 102°; pulse 128; respirations 54. On the left side there was dulness from the second rib, and the heart was pushed over to the right side. He was aspirated and 792 cc. (27 oz.) of fluid removed. After aspiration the chest was clear to the lower border of third rib, below that dulness shading into flatness at the base. The temperature range was high, 102° to 104°, and he had a good deal of cough. The patient was aspirated again on the 23d and one litre of fluid removed. The sputa was examined repeatedly, with negative results, until the 1st of February, when bacilli were found in moderate numbers. The fluid did not re-accumulate to any extent. Very marked defective expansion on the left side. Breath sounds were clear on the right side; fremitus was present on the left side to the base, though the dulness was still very marked, and distant tubular breathing with fine râles. The note states that there was no diffuse, general bronchitis, such as might occur with an eruption of miliary tubercles. Pulse became rapid; he had delirium; the temperature kept high until the 31st, and it fell to 98° on the 3d, when he died.

Autopsy (abstract).—Right pleura adherent over entire extent; firm. Left pleural cavity contains about 1200 cc. of slightly turbid serum. Left lung compressed, tough, leathery, dark red; adherent posteriorly along the spine; lower lobe presented several firm tubercles. The pulmonary and costal pleura layers were thickened and tuberculous. Right lung presented, in the upper lobe, numerous firm, grey tubercles and caseous areas. At the apex a small cavity about 2 cm. in diameter. The lower lobe was very œdematous. A few miliary tubercles scattered throughout

the lung. Small ulcer in the left vocal cord. No tubercles in the liver or spleen; one small tuberculous ulcer in the intestines.

More commonly the pleurisy sets in insidiously, and is the most prominent feature in the case. There may be no suggestions of tuberculosis, but in some instances the history of a previous attack, or of hæmoptysis, may arouse suspicions. After aspiration the fluid re-accumulates, and repeated tappings may be necessary. The patient regains a certain measure of health, with greatly thickened pleural membranes, and persistence of the dulness on the affected side. When these cases are carefully followed, a certain number of them develop unmistakable pulmonary tuberculosis, or they die of a general infection. The following illustrative cases are of interest, from the fact that they were under observation for longer periods than is usual in hospital practice.

Case IX.—Cough and hæmoptysis a year before; gradual onset of the effusion; repeated aspirations; tubercle bacilli found in the exudate; subsequent development of pulmonary tuberculosis.

Christian T., aged 39, German, admitted September 25th, 1889. Patient is a large, well built, muscular man, very well nourished, with thick panniculus adiposis. With the exception of measles as a child, chills and fever in Germany, and a chancre with mild secondaries in 1884, he has enjoyed excellent health. No history of pulmonary trouble in his family. His wife died of consumption four years ago. He was very well and strong until about a year ago, when he had cough with much expectoration, and on one occasion he spat up a mouthful of blood. In January, 1889, he lost in weight, and for the first time began to be short of breath. He had no pain, and was able to be at work, but on any

exertion he became breathless, and he states that this has been his chief symptom, and for it he now seeks relief. He does not think that he has had any fever; temperature on admission was 98°. The patient looks in excellent health; weight about 160 pounds; pulse is 72; tongue is clean. The chest is large, well formed. On quiet breathing there is no special difference noticed, but the right side looks fuller than the left. When he draws a deep breath the right expands very slightly. The apex beat of the heart is visible in the fifth interspace, but an inch and a half outside the nipple line. The intercostal spaces are not marked on either side. From behind, the right side of the chest looks fuller than the left. On palpation there is absence of fremitus on the right side, except just below the clavicle, and there is absolute dulness from the clavicle down, and anteriorly it extends to the left border of the sternum. Breath sounds are feeble and distant on the right side, except in the lower interscapular space, where they are tubular and distant. On the left side the breathing is breezy and loud. On the 28th, 30 ounces of clear fluid were removed. On the first of October the dulness was practically the same, and 30 ounces were again withdrawn. This time it was more turbid. On the 6th he was aspirated again; 25 ounces. Cover slips and cultures were negative. His general condition all this time was excellent. He was up and about the ward, and the temperature was normal. On the 11th he was again tapped, and 32 ounces of fluid withdrawn. He had a very slight cough with much muco-purulent expectoration, which was examined daily for seventeen successive days without discovering bacilli. Although the history of an attack a year ago, with cough and hæmoptysis, raised a suspicion that the process might be tuberculous, there was nothing whatever to guide us to that conclusion; and it was not until he had been under observation for nearly three weeks, and his convalescence was practically established, that tubercle bacilli were found.

On the 18th he was aspirated and 32 ounces were withdrawn, and the note became clear as low as the nipple. On 27th 19 ounces were removed. On November 7th the note reads: "The right lung is fairly resonant to the fourth rib, and in axilla to eighth, posteriorly to middle of scapula." The fluid again accumulated, and on the 16th 28 fluid ounces of a greenish yellow, slightly turbid fluid were removed, in which tubercle bacilli were found by two separate observers on the 16th and 17th. The measurements on the right side, 19 inches, on the left 18½ inches. On the 14th he was aspirated for the eighth time, and 32 ounces of fluid removed, of the same clear character. The note was resonant to the fifth rib and behind to the middle of the scapula. In these regions the breath sounds were loud and free from râles. Cultures from this fluid remained negative, and no bacilli were found. Patient gained in weight, lost the cough entirely, and was only short of breath when walking fast. Appetite good; sleeps well. He decided to go out, and was discharged December 19th. At the time of his discharge resonance was clear and a little high-pitched on the right side to the third rib in front; below this there was absolute flatness. Behind it is high-pitched to spine of scapula, and below the note is flat; left lung clear. Breath sounds are normal. This patient was under my observation on and off in the dispensary for many months, and at first seemed to do well. Subsequently he was lost sight of, but I heard that he had developed extensive tuberculous disease of the lungs.

Case X.—Cough for several years, but good health; gradually shortness of breath; right-sided pleural effusion; repeated aspiration; great improvement; discharge; subsequent detection of bacilli in sputum; development of pulmonary tuberculosis.

Henry H., stevedore, aged 36, admitted June 13th, 1889,

complaining of severe cough. A sister and one brother died of consumption; father of asthma. The patient has been an extremely healthy man, and looks vigorous and well nourished. He states, however, that he has had a cough for many years, certainly for as long as three years. He has been getting short of breath lately. Patient is not at all anæmic; chest is well formed; the right side looks full, and is almost motionless on deep inspiration; the apex beat is in the fifth interspace, two inches outside the nipple line. The left side measures 19 inches, the right 20 inches; expansion on the right side is scarcely a quarter of an inch; on the left over an inch. Percussion gives on the right side a dull note to the clavicle in front, behind to the top of the lung, and to the left a little beyond the mid-sternal line. The left side is resonant. Tactile fremitus is very much lessened, but on saying 99 it is not entirely absent on the right side. Breath sounds are distant, feeble, scarcely audible. Whispered voice over the dull region behind is not heard. Exploratory puncture shows a thin, greenish yellow, sero-purulent fluid. The following day he was aspirated and 2½ litres of fluid withdrawn; the accumulation was rapid, and on the 17th the condition was very much as before. He was aspirated again, and 32 ounces of fluid removed. This fluid was greenish yellow, with many fat molecules. The fluid re-accumulated rapidly, and he was aspirated again on the 19th with a withdrawal of 32 ounces, and on the 22d with a withdrawal of 29 ounces, and on the 26th with a withdrawal of 27 ounces. On the 29th it was noted that in front percussion is now clear to the level of the nipple; dulness from this point down. Posteriorly it is clear to the middle of the scapula. There are fine crackling râles in the axilla, distant breath sounds over the dull area. By the 8th of July he had improved so much that he was discharged. The heart impulse was in the fifth interspace, just below the nipple, and there were marked friction sounds

in the left mammary region and in the scapular region behind. The cover slips and cultures made by Dr. Abbott from the fluid were negative. When he entered the hospital the sputum was abundant, sero-purulent, and was examined repeatedly with negative results. Subsequently his cough lessened and expectoration was more scanty, thicker, and greyish yellow in color. At no time did the temperature rise above 100°, and it was usually between 98° and 99°.

He left the hospital with a diagnosis of pleurisy with effusion, and though there was a suspicion, based chiefly upon the fact that he had had a cough for so long, the diagnosis of tuberculosis could not be positively made, and he looked such a vigorous, healthy man that it did not seem likely. He attended in the dispensary, where I saw him repeatedly. On the 20th of July it was noted that though the apex beat was just below the nipple in normal position, there was everywhere defective resonance over the right side, not absolute flatness, and everywhere from the second rib down there could be heard a loud, leathery, creaking friction. He remained in very good condition, though the cough still persisted. He had no fever. On September 10th tubercle bacilli were found in his expectoration. The leathery, creaking friction persisted, and the defective resonance on the left side. He had lost somewhat in weight, and the cough had become aggravated. On September 4th, 1890, I made the following note: There is marked depression of the right shoulder; shrinkage of the right chest. Heart is a little drawn over; impulse in left parasternal line. The resonance is defective above, and shades to dulness below the level of the fourth rib. The tactile fremitus is felt to the base. At the right apex the breath sounds are somewhat feeble; there are numerous râles on coughing, and on drawing a deep breath the sounds are amphoric. Marked cavernous breathing at the apex behind.

The breath sounds are feeble over the whole of the right base. Patient was under observation throughout 1891. He constantly had cough, and lost a good deal in weight. On the 22d of June the note was: He still looks well; the feet swell at intervals; temperature normal; the right chest more contracted and the spine is curved. Even on deep inspiration there is very little mobility. Marked cavernous signs at the right apex. There is no note of the patient after this date.

Case XI.—Pleurisy five months before; acute onset of second attack; effusion on left side; gradual recovery; detection of tubercle bacilli in sputum, three and a half years after signs of disease at both apices.

The following case illustrates the importance in diagonsis of a systematic examination of the sputum:

Jos. A., aged 29, German, admitted July 1st, 1889, complaining of pain in the chest, cough and shortness of breath. A brother died of consumption in 1885. Parents dead, not of tuberculosis. The patient was well as a boy and enjoyed excellent health. Five months ago he had an attack similar to the present one; was ill in bed for two weeks. He got quite well, but it left him with a little cough. Present illness began six days ago, June 24th, with fever, chilly feelings, and slight cough. He worked until the 29th, and only went to bed yesterday; temperature on admission 102°; respiration 40; pulse 96. Well built, healthy looking man. Chest well formed, movements equal in upper zone, less on the left side below; most evident on deep inspiration, when the difference in expansion is also very noticeable. Tactile fremitus is much lessened at the left base. There is a hyperresonant note at the left apex, extending into mammary region and axilla, which shades into dulness below the seventh rib, a dulness which is

extremely movable and ascends when he sits up. Behind it reaches to the middle of the scapula. Distant, tubular breathing over the dull region. No friction. Sounds on the right side clear.

Apex beat of the heart not palpable; sounds clear. Dulness in the sitting posture at the level of the fourth rib; movable dulness very marked. The temperature 101°; the cough is better; sputum is muco-purulent, and does not contain bacilli. On the 8th the temperature had fallen to 98°. The effusion had not increased, and the movable dulness is now more difficult to obtain. Though there were a few râles in the left infra-clavicular space, there did not appear to be signs of any cavity. The pleural effusion gradually diminished, and we were inclined to regard the case as one of simple pleurisy. He still had cough, with streaked mucoid and yellowish expectoration, and in it, on the 18th, well-characterized tubercle bacilli were found. He improved very much, and on the 22d decided to go out. On the left side the resonance was clear to the sixth rib. There were subcrepitant râles over the third rib, and in the lower axilla slight friction sounds. There was dulness in the infra-scapular region, diminished tactile fremitus, and feeble breath sounds.

This man was lost sight of until February, 1893, of the present year, when he applied at the dispensary, complaining of cough and pains in the chest, and diarrhœa. He has kept pretty well since his attack in 1889, and has been at work. He is now fairly well nourished. He has very slight expectoration, and none could be obtained for examination. There is rather a high-pitched note over both apices and there are moist râles, greatly increased by coughing.

The effusion in these cases is sero-fibrinous, often has a

greenish tint, is sometimes a little turbid. The fluid is not hæmorrhagic so frequently as in the more acute cases. Bacteriologically it is commonly sterile, though in the case of Christian T. tubercle bacilli were found in the exudate itself.

Sero-fibrinous pleurisy, occurring in the course of pulmonary tuberculosis, does not interest us very much. The cases are by no means uncommon, and the diagnosis is readily made. It may be a very early complication and over-shadow in great part the lung disease. The insidious onset and the absence of pain in the side not infrequently lead to errors in diagnosis, and the increasing shortness of breath may be attributed to advance in the original disease, or even to a general tuberculosis. It has seemed to me that the early implication of the pleura, even with recurring exudation, gives a stamp of chronicity to the case. Sometimes it is difficult, even post-mortem, to determine which has been the primary disorder, as in the following case; though, from the great thickening, it is probable that the affection of the pleura preceded the disease at the apices.

Case XII.—Extensive pulmonary tuberculosis; chronic tuberculosis of right pleura.

Alice S., aged 20, colored, admitted October 12th, complaining of cough, shortness of breath, and weakness. She knows nothing of her family history, further than that her mother died of asthma.

Patient was healthy as a young girl. About four months ago she had a child; was in bed for eighteen days. Her present illness began, she thinks, about a month ago. She has had a cough, but has been able to work until three weeks ago. Says she has only been spitting "thick stuff" for about two weeks, and during this time she had had a great deal of shortness of breath.

Present condition.—She is emaciated; much more so than is consistent with a history of an illness of such short duration. The thorax is long and narrow. The clavicular depressions are marked. The expansion is more marked on the left than on the right side. Briefly, the physical examination gave—at the left apex, signs of an extensive cavity, with cracked pot sounds, and amphoric breathing; at the right apex there were indications of a smaller cavity. Behind, there was marked dulness in the supra-spinous fossæ, and impaired resonance over the whole of the right side below the spine of the scapula, with feeble breathing, and râles only on full inspiration. The abdomen was swollen and tympanitic; no signs of effusion.

The patient had an irregular, hectic fever; her pulse was very rapid; she failed progressively, and died on the 18th.

Post mortem (by Dr. Flexner. *Abstract*).—The pericardium is adherent to the right pleura, but is itself smooth on both of its layers. The right lung is universally adherent; the left is adherent at apex and in places behind. The left lung presented a large, irregular cavity at the apex, numerous groups of miliary tubercles and caseous masses, with small cavities in the middle and lower lobes. Where adherent, the pleura is not specially thickened.

On the right side the pleura is everywhere adherent; the entire lung is much reduced in volume, and measures only 12.5 cm. in length. The top of the upper lobe is occupied by an irregular cavity lined with slate colored granulation tissue. The pleura of this lung is enormously thickened, more particularly the costal layer, which measures 9 mm. on the side, and about 11 mm. on the diaphragm; and in other places it is at least 2.5 cm. The thickened membrane is uniformly yellowish in color, and shows cheesy masses. Where the visceral and costal layers are not adherent there is fibrinous exudate on both surfaces, which, when scraped off, shows tubercles on the membranes.

The bronchial glands are coal black in color, and caseous. There is marked intestinal tuberculosis, and the retro-peritoneal glands are enlarged and caseous.

(*b*) *With purulent exudate.*

I have already spoken of the acute purulent form of tuberculous pleurisy. Such cases, however, are rare. The purulent tuberculous pleurisies are much more commonly sub-acute in onset, chronic and latent in their course. The effusion is usually sero-purulent, thin, and contains a large amount of fatty matter. It is somewhat interesting to note that among the 32 cases in which tuberculous pleurisy of one form or another was present in the cases examined post-mortem from my wards, there was not an instance of purulent effusion, except in pyopneumothorax secondary to tuberculosis of the lung. In the non-tuberculous cases there were but two with purulent exudate, one consecutive to an acute croupous pneumonia, in a case, oddly enough, of tuberculous peritonitis; the other in an old man with arterio-sclerosis, who had a purulent effusion on the left side and a sero-fibrinous pleurisy on the right. In both instances pneumococci were found in the exudate.

Our clinical reports embrace ten cases of pyopneumothorax, of which eight were tuberculous, and which, of course, do not interest us specially in this connection. Of the 16 cases of empyæma, nearly all of which were transferred as soon as possible from the medical to the surgical side, there was a history of tuberculosis in the father or mother in five cases; in one case two sisters died of tuberculosis; and in one an aunt. One case followed cancer of the pancreas, and one was in an old man with arterio-sclerosis; four cases followed pneumonia. Of the 14 cases which were operated upon, 12 left the hospital either perfectly well or very much improved. The only death was in the instance of empyæma secondary to cancer of the pancreas.

Unfortunately I have not full particulars of the bacteriological examinations made in all of the cases. The details of the early ones, taken by my late assistant, Dr. Meredith Reese, have been mislaid since his untimely death; so that, from our personal experience here, we can draw no conclusions as to the number of these cases in which the lesion really depended upon the presence of tubercle bacilli. I would again refer to the somewhat interesting circumstance that, with the exception of the pyopneumothorax cases, not a single instance of tuberculous purulent pleurisy was met with in the 101 autopsies in which pleurisy of one form or another was present.

(*c*) *Chronic adhesive tuberculous pleurisy.*

The special feature of chronic tuberculous pleurisy is the enormous thickening of the serous layers. In all the cases of chronic sero-fibrinous exudate the visceral and parietal layers were greatly thickened. Post-mortem, we see three varieties of this form.

(1) Primary proliferative tuberculous pleurisy. Any one of the three great serous membranes may be primarily affected in tuberculosis, though probably in the majority of all these instances the affection of the lymph sacs is secondary to that of the glands in connection with them, or the organs which they ensheathe. In this form the tubercles developing in the pleural and pericardial membranes cause early union of the surfaces, and there is never at any time a free exudate. With the progressive growth of the tubercles the layers become greatly thickened, and united may measure from 1 to 2 or more cm. in diameter. On section the thickened membranes seem to be made up of diffuse tuberculous tissue, sometimes caseous layers, and much fibroid tissue. In the early stages of the process grey and greyish yellow tubercle nodules are seen. With the exception of involvement of the bronchial glands, this may be the only

tuberculous process in the body. It may be unilateral or bilateral. I have seen but two instances in which it was strictly confined to the pleura, without any sero-fibrinous exudate. One was a young, vigorous Irish girl, who had recently come to the country, and was admitted to my wards at the University Hospital, Philadelphia, and died on the third day of an attack of malignant scarlet fever. The pleural layers on one side were enormously thickened, and in the condition just described. The other instance was a case of typhoid fever, which died under the care of my colleague, the late Dr. Ross, where the young man had bilateral chronic adhesive tuberculous pleurisy without any effusion. It is not infrequent to see this condition in part of the pleura, with pockets of a sero-fibrinous or curdy exudate at the sides or back, or on the diaphragmatic surface. Dr. Flexner showed at the Johns Hopkins Hospital Medical Society a remarkable case, to which I shall refer again in a few moments, in which both layers of the pleura, but particularly the costal, were enormously thickened, and miliary tubercles and larger cheesy masses were present. On the diaphragmatic surface alone there was an encapsulated sero-fibrinous exudate.

(2) Much more commonly, with very great thickening, and in the upper zone perhaps union, of the pleural membranes, there is separation of the layers below and on the diaphragmatic surface by an exudate usually sero-fibrinous, but sometimes containing curdy or even cheesy material. Thus of the 32 cases presenting post-mortem tuberculous pleurisy, there were 12 with very greatly thickened pleural membranes and sero-fibrinous exudate. Of these six were in connection with old pulmonary tuberculosis. As in Case I., referred to under the acute form, the onset may be abrupt as in acute pleurisy. The membranes gradually become greatly thickened. In that case there was an encapsulated serous effusion over the postero-lateral part of the left pleura, and in the rest of its extent the two layers

had united, and ranged in thickness from 1.5 to 2 cm. In connection with this variety there are two points of very great interest. In the first place it may be extremely difficult to recognize at sight that the process is tuberculous. In this very case of John A., who had been under our care and tapped repeatedly two and half months prior to his entrance to the hospital with an acute pnuemonia, it was only the closest examination of the dense, thickened pleural membranes which revealed old fibroid tubercles. A superficial, macroscopical examination might have entirely overlooked the tuberculous character of the process, as the lung on the left side presented no tubercles or caseous areas. Of course, it would have been in any case a suggestive fact that at the apex of the right lung there was an area of caseation and softening the size of a walnut, but I repeat again, as it is a point of importance, that without the most careful scrutiny the nature of the extensive, chronic pleurisy on the left side might have been overlooked. The second point of interest is the fact, well shown in the case just mentioned, and also in the case of John P., that a chronic tuberculous pleurisy may exist for a long time, and lead to great thickening without any extension of the fibroid process into the lung itself.

(3) And lastly, in some instances the fibroid processes in the pleura may invade the lung tissue, and lead to extensive sclerosis. In only one instance out of the 32 instances of tuberculous pleurisy was there any evidence of direct involvement of the lung.

Case XIII.—Chronic tuberculous pleurisy; interstitial pneumonia.

Wm. S., aged 60, admitted November 1st, 1890. The patient is a large, strongly built man; states that his family history is good; denies syphilis; has used alcohol to excess; had typoid fever five years ago; rheumatism six years ago.

He came in complaining of shortness of breath and cough, which symptoms he has had since the spring of the present year. He states also that he has lost very much in flesh. Has had no diarrhœa; no hæmoptysis, and does not think that he has had much fever.

Though a large framed man he is somewhat emaciated, and is anæmic. Pulse is 100; respiration 36. Chest is broad, of good depth; costal angle 90. There is deficient expansion on the left side; no definite dulness at the apices, or axillæ; at the left base the note is high-pitched. The breath sounds are enfeebled in front; expiration slightly prolonged; a few dry râles heard occasionally. There is a friction sound in the lower left axilla. At the left apex the breathing is puerile in type, with fine crackling râles. Many tubercle bacilli were found in the sputa. The case was regarded as one of senile tuberculosis, with some emphysema. He had repeated attacks of shortness of breath, and on the morning of the 9th he had a very severe attack, with small, rapid pulse, and died apparently in syncope. The temperature was very irregular, frequently sub-normal, as low as 96°, and on several occasions 95°.

Autopsy.—In right pleura cavity about 200 cc. of cloudy fluid. The pleura is divided into many compartments by fibrous septa. Both layers are thickened, and present many miliary tubercles and tuberculous granulation tissue. Left pleural cavity is obliterated by firm adhesions. The lungs are voluminous, and they do not retract on opening the chest. There are numerous, dense bands of fibrous tissue running through them, most marked at the apices, and these bands extend directly from the pleura into the lung substance, particularly from the root. There are small areas of caseous pneumonia. The bronchi of both lungs are somewhat dilated and filled with muco-purulent contents. There is a cavity the size of a hazelnut at the apex of the right lung. The condition is

that of an interstitial pneumonia, with dilated bronchi, and an extensive tuberculous pleurisy on the right side. There is a small tuberculous ulcer in the larynx.

3. *General serous membrane tuberculosis.*

There is a group of cases of tuberculosis in which the serous membranes are chiefly involved, either simultaneously or more commonly one after another, forming a clinical type fairly distinctive and readily recognized. There have been several interesting studies of this condition, notably the Paris Theses of Moran and Boulland in 1884 and 1885, and the careful study of Vierordt.* The pleuro-peritoneal membranes may be alone involved, or the pleuro-peritoneal and pericardial surfaces. There are, as noted by Boulland, three groups of cases. First, an acute tuberculosis, with rapid evolution of the disease in pleuræ and peritoneum, generally consecutive to local disease of the tubes in women, or of the mediastinal or bronchial lymph glands.

Second; cases in which the disease is more chronic in its nature, with exudation in both peritoneum and pleuræ, the formation of cheesy masses, and the occurrence of ulcerative and suppurative processes. In this group the pleural involvement is much more commonly secondary to the peritoneal, or both may be a sequence of pulmonary tuberculosis.

And, third, there are instances in which the pleuro-peritoneal affection is still more chronic, the tubercles hard and fibroid, both the membranes showing much thickening, often with very little exudation. My experience with this form of general involvement is not great, and of the 34 instances of peritoneal tuberculosis which have been under our observation at the Johns Hopkins Hospital, in only one was there involvement of the pleura.

I have not met with an instance in which the three serous

* Zeitschrift für Klinsche Medecin, Bk. XI.

surfaces were involved together, though many such are on record, and in some the disease has been almost exclusively confined to these membranes.

A knowledge of the existence of this combined infection is somewhat important, as such cases are often of great obscurity. More commonly the affection begins in the peritoneum and may be extremely chronic, and then gradually invades the pleura. In other instances there is a sub-acute pleurisy and subsequent invasion of the peritoneum. The cases often have a very protracted course; there are periods of great improvement, and there may be little or no fever. The following case is at present under observation:

Case XIV.—Pleuro-peritoneal tuberculosis; an illness with anasarca; great improvement; persistence of ascites; development of right-sided pleurisy; draïnage of peritoneum.

R. A. B., colored, aged 30, farmer, admitted May 9th, 1893, complaining of swelling of the abdomen. Father and mother, two brothers and one sister living. Was healthy as a boy; measles at 19, scarlet fever at 27, no other serious illnesses. Married ten years, wife healthy, three children. Has not had veneral disease; has been a temperate man. For two years past patient has had failing of eye sight (cataract), which, he says, is due to irritating dust.

Present illness dates from last October, when he had an attack of gradually increasing shortness of breath, with swelling of the legs and body. Evidently this was a very severe illness, as he was confined to a chair for three months, and was not able to lie down. He had no special cough, but does not know whether he had much fever. The swelling in the legs gradually disappeared, and has been absent now for about three months. The swelling in the abdomen has persisted. He complains chiefly of shortness of breath on

exertion, and of the swollen abdomen. He has a little cough and slight, scanty expectoration. Patient is a medium-sized, moderately well built man; face not specially emaciated. The temperature on admission was 97.5°; rose in the evening to 103°. He lies quietly in bed, head not elevated, no respiratory distress. The conjunctivæ are a little yellow, pupils are dilated. Mucous membranes are somewhat pale. Pulse is regular, 90 to the minute, the vessel-wall a little sclerosed. The brachials pulsate visibly. The chest is well formed; costal angle good; the lower part of the thorax is expanded. On deep inspiration the left side moves more than the right. Percussion gives a dull note on the right side, beginning at the sixth rib in the recumbent posture, and in the erect posture at the fourth rib, the dulness being distinctly movable. Behind, when sitting up, the line of dulness is above the angle of the scapula. Percussion is clear throughout the left side. Tactile fremitus is diminished over the dull area on the right side, and the breath sounds are feeble. There is no friction murmur heard. Apex beat of the heart is not very distinct; pulsation in the fifth space, just inside the nipple line. The sounds are everywhere clear. A needle was inserted into the pleura and a serous, greenish yellow fluid was withdrawn, containing a little blood, which did not coagulate on standing. Cover slip preparations of the serum showed no organisms, and cultures on agar remained sterile.

The abdomen is distended and large, but symmetrical in the flanks and a little prominent in the umbilical and epigastric regions. On palpation it is everywhere soft, painless, not resistant, except in the upper zone, a little above the level of the navel. In the whole of this region up to the xiphoid cartilage and the costal margin, there is an ill-defined, doughy resistance, which terminates below in a tolerably well-defined border. On three separate occasions a very definite friction murmur was felt. The edge of the liver

is not palpable on deep inspiration, nor can the margin of the spleen be felt. On percussion there is tympany in the hypogastric and umbilical region, slight dulness in either flank, which is movable; no distinct fluctuation wave. There is a flat tympany in the epigastric and hypochondriac regions. The liver dulness begins at the border of the sixth rib, and extends to the costal margin in the nipple line. There are no glandular enlargements; no œdema of the feet. The urine is clear, a faint trace of albumin, a few leucocytes, and a few red blood corpuscles. The temperature during the first week of admission was irregular, ranging usually between 98° and 100°, but on three occasions rose to 103° in the evening. Frequently the morning temperature was very low. After May 16th his temperature did not go above 100°. He has gained in weight, and the small amount of sputum which has been obtained has always been negative.

A diagnosis of pleuro-peritoneal tuberculosis was made, and on the 10th Dr. J. T. M. Finney made an exploratory operation in order to drain the peritoneum. A quantity of dark, reddish-brown liquid was removed. The peritoneum was deeply injected, and the visceral layers studded with numerous grey and yellow-grey nodular tubercles. The omentum was rolled up, and there was great thickening about the stomach and colon.

It is not very uncommon to see the pleura and peritoneum involved secondarily in chronic disease of the lungs.

Case XV.—Pleuro-peritoneal tuberculosis in chronic pulmonary tuberculosis.—(Abstract).

D. W., aged 18, colored, admitted November 21st, 1889, complaining of cough, fever, and pain in the abdomen. About two months before admission he was wrecked and exposed in a boat for 24 hours. He dates his illness from

this time. He can give no details as to his family history. He had syphilis in the spring of 1889. The patient was a medium-sized, fairly well nourished young man, and at the first examination there were signs of disease at both apices, most marked at the right. There was high fever, and very rapid extension of the pulmonary disease, a large excavation developing within a few weeks at the top of the right lung. There were friction sounds heard in the axillary regions, and particularly marked on the left side. The abdomen was full and distended, sometimes painful, and he had diarrhœa. The patient did not improve in any way, but the fever persisted, and he became greatly emaciated, progresssively weaker, and died January 25th.

Autopsy.—Anterior mediastinal glands caseous. Both lungs were bound down by firm adhesions. The pleural membranes thickened; the costal layer, easily stripped off, was covered with fibrinous exudate, beneath which were numerous tubercles and caseous masses. On the pulmonary pleura there were numerous tubercles and flat caseous areas. Both lungs showed large cavities at the apices, numerous caseous areas, and miliary tubercles disseminated and in groups.

There was only a small amount of clear fluid in the peritoneum; the intestines were agglutinated, and on the peritoneal surface many groups of tubercles and flat caseous masses. The mesenteric glands were greatly enlarged and caseous. There were numerous tuberculous ulcers throughout the entire intestine, beginning just beyond the pylorus and extending to the rectum. There was tuberculous ulceration of the bladder.

We have many opportunites of seeing slight extension of the disease through the diaphragm, either downward from the pleura, or more often from the peritoneum into one or other pleura. In the following case there was extension rom the right pleura to the under surface of the diaphragm, and to the peritoneum covering the liver.

Case XVI.—Pulmonary tuberculosis; chronic tuberculous pleurisy; tuberculous peri-hepatitis; circumscribed tuberculous peritonitis.—(Abstract).

A. F., female, aged 19, admitted June 6th, 1892, complaining of shortness of breath. She had been in failing health ever since the birth of her child March 19th, 1892, when she had a severe cough, which has persisted ever since. She was pale, emaciated; respirations 44; pulse 148. There was deficient expansion at the right apex and signs of commencing cavity. She was in hospital during July and August, and signs of extensive pleurisy developed on the right side, for which she was aspirated and seven and a half litres of serous fluid removed. She had marked hectic fever. The pleural symptoms were complicated by the presence of a large abscess in Scarpa's triangle, which was opened and drained. She died September 12th of hæmoptysis.

Autopsy.—In the anterior mediastinum there were miliary tubercles and caseous masses; both pleural sacs obliterated. The parietal layer of the pericardium, adherent to the pleura, presented numerous fresh gelatinous looking tubercles. The lung and visceral pleura on the left side removed together. The layers were greatly thickened, and were covered with a hæmorrhagic, rough exudate 1 to 2 mm. in thickness. The right pleural sac also obliterated, and the membranes united by old adhesions; no acute pleurisy. Throughout the left lung there were several cavities; one at the apex, 3×3 cm., and in this there was a ruptured aneurismal dilatation of a branch of the pulmonary artery.

The under surface of the diaphragm on the right side was adherent strongly to the liver and covered with numerous grey tubercles, which were also present in numbers on the upper surface of the liver, and there were numerous hæmorrhages about them.

There was tuberculous disease of the lumbar vertebræ. The mesenteric glands were enlarged, but not caseous. There were tuberculous ulcers in the ileum.

Attention has often been called to the frequent association of tuberculous pericarditis with tuberculous pleurisy. Thus of 17 cases which I recently described* there was combined disease of these membranes in Cases IV., VII., and XV. In the following case the pericarditis in all probability followed the chronic tuberculous pleurisy.

Case XVII.—Chronic tuberculous pleurisy on the left side; acute tuberculous pericarditis and pleuritis dextra.

John P., aged thirty-eight years, admitted August 18th, with swelling of the legs and dyspnœa. The family history is good. He has been, as a rule, healthy, though in his childhood and youth he had many of the infectious diseases. He has been a moderate drinker. He denies syphilis. The present illness began about two weeks ago with pain in the left shoulder and about the heart. Feet began to swell ten days ago, and he has had cough and shortness of breath for about the same length of time. He has had no nausea; his appetite has been fairly good. Within the past few days he has become much worse.

On admission the patient had intense orthopnœa; pulse 130, but moderately full. He had a distressing cough, with clear watery expectoration. There was great œdema of the lower extremities and of the scrotum. The finger-tips and mucous membranes were bluish in color. In the examination of the heart at the time no murmur could be detected, but the second sound was accentuated at the pulmonary cartilage.

On the following morning the patient was quiet; respira-

* American Journal of the Medical Sciences, January, 1893.

tions 28 to the minute; pulse 84, the beats irregular both in rhythm and force, the volume fair, and tension not diminished.

Thorax apparently symmetrical, but the manubrium very prominent, expansion equal. In front, resonance on both sides good, though on the left side flatness begins at the fifth rib midway between the nipple and axillary line, and the dulness seems here to be somewhat movable. There are numerous sibilant and sonorous râles to be heard in front. Passing down the left side and into the axilla, the breath sounds become more feeble and fine moist râles are heard. Pitch of resonance at the extreme left base is higher than at the right, and the vocal resonance is somewhat diminished.

On auscultation there are numerous coarse and medium fine ràles to be heard at both bases. At the extreme left base the respiratory murmur is almost absent.

Heart: Point of maximum impulse difficult to localize; slight general heaving over the whole præcordial area; relative dulness begins above at second rib and extends well to the right of the sternum. The prominence above noted is just at the junction of the manubrium and gladiolus, and just at this point there is dulness over a very limited area. Relative dulness extends outward to a point nearly 5 cm. outside the nipple. The heart-sounds are heard with the greatest intensity at the fifth space a little inside of the nipple line. There the first sound is full and booming; the second not so loud. Passing inward toward the sternum the sounds become associated with a superficial, soft, squeaking sound, diastolic in time, heard loudest over the mid-sternum, and pericardial in character. This is heard faintly all over the base. The murmur is more distinct in forced expiration than during inspiration. The second pulmonic is a trifle louder than the second aortic sound. The radial pulses are equal in volume, and there is no pulsation in the upper sternal notch; there is no tracheal tugging. The exam-

ination of the abdominal organs is negative. The urine is yellow-colored, acid, sp. gr. 1024, distinct trace of albumin; several hyaline casts were found. Throughout the 20th and 21st the patient remained in much the same condition. On the 22d there was a slight rise in temperature to 100.5°; the pulse varied greatly in rate and character; at noon was slow, regular, and full, from 70 to 90 per minute, and again was as rapid as 140. The patient, in many respects, was better. The œdema of the legs had disappeared. The urine had increased in quantity. On the 19th only 180 c.c., and on the 20th 350 c.c. had been passed. On the 21st and 22d the amounts were 700 and 1100 c.c.

23d. The temperature has been between 97° and 98°; at the morning visit the pulse was 148, regular in force and rhythm; the respirations 32. The patient was lying quietly on left side. The physical signs practically those noted above, with the exception that there is an extension of the œdema at the base of the lung. The patient died suddenly at 4.30 P. M. to-day.

Autopsy (by Dr. Flexner). — Large, muscular man; moderate œdema of the legs and of the subcutaneous tissue of the trunk. Fat well retained, both beneath the skin and in omentum and mesentery.

Pericardium is adherent to the left pleura; the sac thickened and contains a considerable amount of clear serum. Both layers are covered with a thick fibrous deposit, looking like a hairy coat. The thickness of the pericardium over the heart is 3 mm. When incised the thickened layer is grayish in color, with many opaque or yellowish points scattered here and there, often continuous, and having the well-recognized characteristics of tubercles of this membrane. The heart was greatly enlarged. The valves were normal. The thickness of the left ventricle was 17 mm.; length of ventricle, 8.5 cm.; mitral orifice, 10.5 cm. in cir-

cumference. Thickness of right ventricle 6 mm. Tricuspid orifice 12 cm. in circumference. The walls of the auricular appendix are almost completely converted into a grayish-white material with only a thin internal film which appears like muscle. In the endocardium of the left ventricle are numerous ecchymoses. There are also a few small ones on the right ventricle and in the auricles, and on the endocardium of the auricles are a few small, round, whitish miliary tubercles.

The left pleura is much thickened; parietal and costal layers adherent in places, but where not in actual contact there is clear serum between them. The costal pleura strips up with difficulty, and is very hard and cuts like cartilage. The diaphragmatic pleura is especially thickened, and on section it is seen to be composed of a dense, almost cartilaginous, grayish tissue, containing yellow, opaque, caseous masses. The apex of the left lung is retracted, hard to the touch, and on section contains a dense, deeply pigmented connective tissue, and old areas of caseation; no calcification. There are a few small foci of miliary tubercles, and scattered fibrous tubercles elsewhere in the lung.

The right lung is voluminous, and in the greater part of its extent free from adhesions, but the pleural surfaces present numerous grayish-white elevated masses, single and conglomerate, which can be scraped off with difficulty. The costal pleura present similar tubercles. About these there are, here and there, fresh fibrin. In the apex the upper lobe presents a few foci of fibrous miliary tubercles.

The spleen contains a few scattered tubercles. Nothing of note in the abdominal viscera; the intestines did not present tubercles.

III. General Pathology.

The pathology of serous membrane tuberculosis turns on the avenues of infection rather than upon any special pecu-

liarity in the lesions. Miliary tubercles, with inflammatory exudate, serous or hæmorrhagic; acute, rapidly caseating and ulcerative processes with necrosis and suppuration; a chronic fibro-tubercle, nodular and diffuse, are here met with as in the lungs and elsewhere,—and the chief interest relates to the

Avenues of Infection.

(1) Doubtless a great majority of all cases of tuberculous pleurisy arise from direct infection from the lung, a tuberculous focus invading the membrane, as may be seen any day in the autopsy room. Rapid development of a fibrinous exudate at the spot controls the extension, blocking the lines of transmission and limiting the process. Though directly excited by contiguity, the pleurisy is not always associated with an eruption of miliary granules, but may be simple. There would appear sometimes to be an antagonism between the pleural and pulmonary disease, and it will have been noted in several of the post-mortems of the cases previously given that very extensive affection of the pleura occurs with very slight or even without any disease of the lung on the side involved. The possibility of infection of the pleura by contact from tuberculosis of the mediastinum, tuberculous abscess of this part, and indeed from cold abscess of the thoracic wall, must also be considered.

(2) Infection through the lymphatics. It was one of the great generalizations of Bichat when he spoke of the serous membranes as "grands reservoirs," a truth demonstrated by the intimate connection known to exist between these surfaces and the subjacent lymph vessels. The beautiful investigations of Klein, Arnold, and others have taught us the complicated anatomy of the lymph apparatus of the lungs and pleura, and also the course of the lymph streams, so that it is not difficult to understand how the

serous membrane may be affected. We all inhale tubercle bacilli, perhaps not daily, but dwellers in cities and workers in hospital wards certainly inhale them very frequently, attached to the dust particles, the fate of which in the respiratory system is well known. A certain proportion in the trachea and bronchi are dealt with by the leucocytes, and are brushed by the cilia to the larynx; the sweepings of the night appear in the dark morning expectoration. Many of the particles reach the alveoli, and are here also in part attacked by the large desquamating cells of the alveolar epithelium, an important function of which is, no doubt, to help in the general scavenger work which goes on incessantly in the lungs. But a considerable number escape the phagocytes of the bronchial tree and of the alveoli, and pass through the openings in the latter into the alveolar stroma. Those from the central air-cells enter the deeper lymph channels which surround the bronchi, and in their course pass through many of the lymph nodes, at every one of which they are attacked, and many of the particles remain fixed in the cells of the follicular cords or permanently imbedded in the stroma. Those particles which reach the more superficial alveoli pass into the wide sub-pleural lymph streams. Here, too, at the periphery of the lobules, as may be seen in the lung of any adult, many of the dust particles are picked out and fixed in the peri-lobular tissue, so that often the lobules are accurately mapped out by a line of black particles. Ultimately, a certain number reach the bronchial glands, which become gradually in all of us, as the years pass, more and more deeply pigmented. The tubercle bacilli attached to the dust particles follow these routes, and their fate depends very much upon the local conditions, which, happily for the majority of us, are not favorable to their growth. It is interesting to note, however, with reference to the mode of infection in tuberculosis, the large proportion of individuals in whose *dust filters*, as the lymph

nodes of the respiratory system may be called, tubercle bacilli effect a lodgement. Indeed there have been important observations within the past few years to show that the bacilli may be present (without having caused any mischief) in apparently healthy lymph glands. There is direct communication between the sub-pleural lymphatics and the sac of the pleura, so that it is possible to conceive of a direct entrance of the bacilli in that way. More commonly, however, the disease spreads from a sub-pleural nodule or a lymph node in which the bacilli have grown. The wide and free anastamoses which have been demonstrated to exist in the lymph vessels of the pulmonary pleura favor the rapid diffusion of the virus under suitable conditions. Possibly, too, in some instances, direct infection may take place from the bronchial and tracheal lymph glands. Under all these circumstances it is the visceral layer of the pleura which is involved. The lymphatics of the parietal pleura have wide and extensive communications, discharging as they do partly into the lymph glands along the vertebræ, and partly in the anterior mediastinal group, along the internal mammary artery. Infection may come from the lymphatic glands in the neck, particularly the supra-clavicular, which communicate freely with those of the axilla and of the sub-maxilla. Infection of the pleura in tuberculosis of the glands in these two groups has been frequently noted, and has been made the subject of a special essay by Hernandez.

In rare instances the disease may extend to the pleura from tuberculous caries of the bones in the neighborhood. An interesting instance of this was reported to the Johns Hopkins Hospital Medical Society by Dr. Flexner last winter. A colored man, aged 24, had a sinus in the neck which led to an erosion, involving the outer third of the right clavicle. The supra-clavicular glands in the neighborhood were involved, particularly the group between the clavicle and the upper border of the pleura, which were

enlarged and caseous. The right costal pleura was greatly thickened, firmly united to the visceral layer, except on the diaphragmatic surface on which there was a cavity the size of an orange filled with a sero-fibrinous exudate.

And lastly, the pleura may be infected through the wide communications which exist between the lymphatics of the peritoneum and those of the diaphragmatic pleura, and the lymphatics of the mediastinum.

IV. Diagnosis.

A disease presenting clinical variations so extreme as those which I have attempted to portray must necessarily offer at times serious difficulties in its detection. At the outset it may be frankly acknowledged that often in cases of acute sero-fibrinous pleurisy, coming on with chills and fever and gradual effusion, we have not the data upon which to base a diagnosis. Neither the appearance of the individual, the family history, the onset, the course, or the character of the exudate may be in any way suggestive. On the one hand, there can be no question that many instances, as in Case I., so often referred to, occur in robust individuals of previous good health, with all the characters of pleurisy *a frigore*; and yet the subsequent history may point very clearly to the fact that the process has been from the outset tuberculous. On the other hand, the view which has of late found so much favor, that a large proportion of all acute pleurisies are tuberculous, is certainly unfounded, as shown by the post-mortem notes already referred to, in which non-tuberculous pleurisy of one form or another was present in two-thirds of an unselected series of cases from medical wards. I have already called attention to the points to be specially investigated; the antecedents, family and personal, the careful inspection of the groups of lymph glands contiguous to the pleura, the repeated examination of the expectoration, which may contain tubercle bacilli from even

a very small focus of softening tubercle in communication with the bronchus. On more than one occasion it has happened that their discovery after repeated examination has cleared up the nature of an obscure pleurisy; and it is worth noting that in Case I. the only spot of softening from which the tubercle bacilli could have come in any numbers did not exceed the size of a hazelnut, and was in the lung on the side opposite to that of the effusion. The physical characters of the exudate offer in a majority of instances nothing distinctive. A hæmorrhagic exudation is suggestive but by no means distinctive, in as much as it may occur in cancer, or it may occur with ordinary simple pleurisy, as in two instances in our list. It is important to note that the effusion may be hæmorrhagic in either a chronic or in an acute form. I call to mind one instance in which the presence of hæmorrhagic exudate led us to suspect a terminal tuberculous pleurisy, but there were no tubercles on the membranes.

The bacteriological examination has been made now so frequently in acute pleurisies that there are facts enough at our disposal to warrant a somewhat definite opinion, and the general conclusion is that, except in very rare instances, the serous exudates are sterile, and tubercle bacilli have only been detected in a very moderate number, in only 32 cases, according to the recent article of Prince Ludwig Ferdinand of Bavaria. The inoculation of the exudate into the peritoneum of the guinea-pig, which has been practised in many cases, also gives variable results, but when positive is of great value.

The inoculation with tuberculin is, as mentioned, uncertain, and I may state here an instance in which it led us into error. Just as we were beginning to try it the late Dr. Christopher Johnston sent into the wards a young woman aged about 28 or 29 with a bunch of enlarged lymph glands on the left side of the neck and the axilla.

She was fairly well nourished and made no other complaint but of gradual and progressive enlargement of these groups during several months. Within ten days or two weeks after admission a pleurisy developed on the same side, which we very naturally thought to be tuberculous. She was treated with injections, and the reaction on each occasion was particularly active. No benefit, however, followed them, and some weeks later she went to her home, where she shortly afterwards died. The autopsy, performed by Dr. Councilman, showed cancerous lymph glands in the sub-clavicular and axillary regions and extensive cancerous pleurisy—the primary disease being a nodule of carcinoma about the size of a walnut in the left breast. Some months subsequently, in illustration of the curious coincidences which we all meet in practice, I saw a case presenting striking similarities in the practice of Dr. Burns of Toronto; also in a comparatively young woman, but the infiltration about the pectoral muscle called my attention to the condition of the breast.

The diagnosis of the purulent form of tuberculous pleurisy is less difficult. A proportion of these, at least 75 per cent., depend upon infection with streptococci, the pneumococci, or the staphylococci. The tubercle bacillus may be present and in some acute cases, as in the one referred to, very abundant in the pus. In other instances, definitely proved to be tuberculous, staphylococci have been present, and sometimes the effusion is sterile. The course may be extremely suggestive, and it has long been known that the latent variety of empyæma is not uncommonly tuberculous. As already mentioned, the fluid may not be truly purulent, but the turbidity due to the presence of large quantities of fatty material.

And lastly, a great difficulty in diagnosis may exist in these cases of sero-fibrinous pleurisy which recover with thickening of the membranes and persistence of flatness at the base. The most suspicious instances are those in which

the fluid contsantly recurs in spite of repeated tappings, and in which, with diminution apparently in the amount of exudate, the flatness persists, usually with transmission of the tactile fremitus, and sometimes, as time proceeds, marked flattening of the affected side. The records of Cases I., IX., X., and XI. show a sequence of events only too common. Possibly some of these cases, with flattening at the base and slight retraction, heal, and no further trouble occurs. Certainly they are not always tuberculous, such a process may follow a simple sero-fibrinous pleurisy or an empyæma. Thus in a young woman aged 23, who was admitted to my wards November 17th, 1890, with the right chest flattened behind and at the sides, with dulness at the right base and curvature of the spine (and who died of anæmia associated with syphilis of the liver, and lymphatic nodules), the right lung was firmly adherent, the pleural membranes were thickened, particularly at the extreme base, and between the thickened layers there was a cavity containing about 70 cc. of an opaque, whitish fluid. The cavity presented adherent calcareous flakes, and there was no caseation. Such instances are by no means uncommon in post-mortem work, and unquestionably contraction and flattening at the base and slight drooping of the shoulder may persist for an indefinite number of years without leading to any more damage than perhaps a progressive bronchiectasis in the lower lobe. Clinically, too, these cases are not very infrequent, and though one may have a suspicion from the history, yet good health may be maintained for many years and evidence may be entirely wanting of any tuberculous process.

V. Treatment.

The indications are two-fold; first to limit and control the exudate and to promote its absorption. It would take me far away from the immediate subject to discuss here in

full the therapeutics of pleural effusion. In the early stage it is sufficient to allay the pain, if severe, with opium, to reduce the fever, if high, by sponging, and to keep the bowels freely opened. It is doubtful whether the salicylates deserve the confidence which many claim. To promote absorption various measures are advised. It is important to remember that when fluid remains in the chest it is for the very good reason that it cannot get out, owing to blocking of the lymph paths. Absorption from the pleura goes on, as has been shown experimentally, with extraordinary rapidity, chiefly, if not entirely, from the costal layer. Probably in all instances of pleurisy with effusion, do what we may, the absorption has to await the freeing of the obstructed lymph channels. I still believe that good results are seen by putting the patient on a dry diet and giving brisk, saline cathartics. It is a rational practice, and in some instances I have seen the exudate diminish rapidly. The diuretin, when it acts, is useful in the same way. If at the end of ten days the exudate persists, and is at the level of the fourth rib in the erect posture, aspiration is advisable, and it may be repeated again in a few days if the fluid reaccumulates. So far as I know, there are no greater risks in the tuberculous than in the simple sero-fibrinous cases, and it is very important to relieve the lung early of the compression to which it is subjected by any large quantity of fluid. I think, however, the risk of the compressed lung becoming the seat of tuberculosis is not very great; more serious is the danger lest it should become bound down by such firm adhesions that it cannot expand. Gentle counter-irritation of the skin is probably beneficial in these later stages, stimulating the lymphatics of the costal pleura.*

* The relation between the sub-cutaneous and pleural lymphatics must be very close. A fluid containing colored particles in suspension, injected beneath the skin in the axillary region of a rabbit, finds its way to the costal lymphatics, and the anterior mediastinal glands become stained. (*Canada Medical & Surgical Journal*, 1875. Article on Anthracosis.)

In the cases of chronic sero-fibrinous effusion with thickening of the membranes the fluid re-accumulates rapidly, and aspiration may have to be performed very many times. In these instances systematic pulmonary gymnastics should be practised. The expansive efforts of forcing water from one large Wolff's bottle to another is a good method. When the exudate is purulent the case should be transferred to the surgeon for thorough drainage.

The second indication is to improve in every way possible the general nutrition of the patient, so as to favor conditions promoting the healing of the tuberculous process. No doubt, as in pulmonary and peritoneal infection, many instances of tuberculosis of the pleura recover and leave no more damage than that associated with slight thickening of the membrane. A life in the open air, regular habits and exercise, a nutrious diet, and the use of the remedies which promote in every way digestion and the assimilation of food should be advised. And finally we may lay to heart the words of Sir Andrew Clark: "When we have a patient with basic fibrinous pleurisy, let us hold him fast, restrict his freedom and treat him carefully until every remnant of it is gone."

ARTICLE III.

A CONSIDERATION OF ERYSIPELAS OCCURRING DURING THE PUERPERIUM.

By CHARLES W. GALLOUPE, M.D.
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READ JUNE 14, 1893.

A CONSIDERATION OF ERYSIPELAS

OCCURRING

DURING THE PUERPERIUM.

The complication of erysipelas with the puerperal state presents many points of medical interest, but perhaps the most important of all, at the present time, is the question of infection. The contagiousness of erysipelas has for many years been hotly argued from the clinical standpoint, but no conclusion could be reached until the development of bacteriology made proofs of another and more definite sort possible. The discovery of specific bacteria in anthrax, gonorrhœa, and other contagious diseases, led to the study of erysipelas by similar methods of inoculation with cultures from known cases. The first important contribution to this subject was a record of experiments on eleven cases, published by Fehleisen in 1883[1]. In each case he found a micrococcus of uniform character, especially abundant in the lymph spaces of the tissues actively affected. This was cultivated successfully and inoculated into the ear of a rabbit, where, in eight cases out of nine, the characteristic signs of erysipelas appeared, and the tissues were found to contain a chain-like coccus to which he gave the name of "streptococcus erysipelatis." Later experiments have proved beyond doubt the bacterial origin of the disease in every instance. Before this fact was demonstrated, and while the evidence was wholly clinical, the non-contagiousness of the disease was claimed by many observers, from the absence in their own experience of instances of transmission and from

[1] *Fehleisen*, — "Ætiologie des Erysipels," Berlin, 1883.

the failure to trace out in every case the source and method of contagion. This difficulty suggested the theory of an "idiopathic" erysipelas, and also of a special non-contagious form of the disease[2], while the presence of a gross wound served to distinguish "surgical" from "medical" erysipelas. All forms of the disease are now known, however, to have a single infective cause in the shape of a micrococcus, which enters the system through a wound of the skin or mucous membrane, not necessarily large enough to be visible, perhaps even microscopic, but sufficient to expose the lymph spaces to absorption. In 1884, before this fact was established, B. St. John Roosa[3] announced his opinion that erysipelas was always traumatic in its origin. He did not believe that it could be generated in a sound skin, and explained the cases ascribed to cold, to the "traumatism of a high wind blowing upon the face." In the same year E. L. Partridge,[4] of New York, presented a careful summary of the evidence in these words: "It [erysipelas] is probably never of neurotic origin, nor is it always necessary for it to be preceded by traumatism; there is undoubtedly an idiopathic form in which the poison gains access, in all probability, through the respiratory tract. Of this latter view, however, we have no absolute proof, and the view which insists upon the necessity of an abrasion is therefore entitled to respect."

The fact that erysipelas is now proven to be caused in every case by bacterial infection is sufficient to make its prophylaxis an important matter, and especially in the puerperal patient, presenting, as she does, a wounded surface in the lacerated vaginal wall, and a still more sensitive absorbent area in the uterine cavity with its patent veins and lymph spaces. But the subject assumes a still greater

[2] *Goodridge*, of Bath Royal United Hospital, quoted in Med. & Surg. Journal, Vol. cx., Jan. 1884.

[3] *B. St. John Roosa*, reported in Med. & Surg. Journal, Dec. 1884.

[4] *E. L. Partridge*, reported in Med. & Surg. Journal, Dec. 1884.

importance when we consider the possibility of erysipelas causing by inoculation a puerperal septicæmia — in other words, the possible identity of erysipelas and certain forms of puerperal fever. In proof of the individuality of the streptococcus erysipelatis, Fehleisen says :[5] "Though somewhat similar organisms are found in the pus of wounds and in pyæmia, the mode of growth of the micrococcus of erysipelas is found to be characteristic." This statement was made after limited experiment, and was disputed on two grounds. First, that some cases of erysipelas failed to show the specific coccus ; second, that inoculation of the pure culture from erysipelatous subjects was able to cause, under varying conditions, all the manifestations of septicæmia. The value of experiments of this sort depends largely upon the care and technical skill of the observer, as the failure, in any instance, to discover a micrococcus is not an absolute proof of its absence ; while, on the other hand, imperfect sterilization of apparatus might result in the development of other cocci than the pure culture derived from the erysipelatous tissues. A careful series of experiments on the mouse by Fraenkel,[6] in 1889, showed that inoculation of cultures from erysipelas caused, in one case, purulent ophthalmitis, in another peritonitis, and in a third abscess in the skin of the back. The experiments proved, in his mind, the identity of the streptococcus erysipelatis and the streptococcus pyogenes, while the "clinical differences in the disease were due to the mode and locality of the infection, perhaps also to the quantity of the virus and the disposition of the individual." Verneuil[7] and Cado, in 1889, proved by inoculation the identity of acute lymphangitis and erysipelas, and Mosny[8] found on autopsy of a patient who died two days after the onset of

[5] *Fehleisen*, quoted in Med. & Surg. Journal, Vol. cx., Jan. 1884.

[6] *Fraenkel*, Centralblat für Bakteriologie, 1889.

[7] *Verneuil & Cado*, — Comptes rendus de l'Acad. de Sciences de Paris, Tome cviii., quoted in Cent. für Bakt., 1889.

[8] *Mosny*, La Seimaine Med. No. 7, 1890, quoted in Cent. für Bakt. 1890.

an infectious pneumonia, a streptococcus identical with the streptococcus erysipelatis, as proved by inoculation. The characteristic appearance and behavior of Fehleisen's coccus were disputed by Hell,[9] who reached this conclusion after many experiments: "With our known methods [of staining, etc.] can be seen no noticeable difference between pus and erysipelas cocci; they completely agree in morphological and biological aspects as well as in their behavior towards inoculated animals." A further discovery in the investigation of this subject is claimed by Jordan,[10] who states that "besides the true erysipelas streptococcus, not only the streptococcus pyogenes, but also other pus-formers, such as staphylococcus pyogenes, can cause erysipelas." He concludes that "erysipelas is etiologically not a specific disease. It is regularly due to streptococcus pyogenes, rarely to staphylococcus pyogenes. The difference in the action of the pyogenic coccus on the tissues depends upon difference in localization and upon variation in its virulence (increase or diminution). It is of a quantitative sort." This opinion he bases upon the study of two cases of inoculation from facial erysipelas, but that this was not convincing is shown by the comment of a German critic: "So many conclusions on so few cases; a pity they rest on thoughts rather than facts!" An opinion similar to Jordan's was expressed by Atkinson[11] before the American Dermatological Association in 1887 in these terms: "Erysipelas should be considered the expression of the effect of one of a number of specific causes, and, in that sense, should be regarded as a symptomatic inflammation."

However we may view this matter, the repetition of experiments has led to a general acceptance of the interchangeability of erysipelas and the septic inflammations.

[9] *Hell*, quoted in Cent. für Bakt., 1890.

[10] *Jordan*, (Heidelberg), quoted in Cent. für Bakt. 1891 and 1892. Reported in Med. & Surg. Journal, Vol. cxii., 1887.

[11] *J. E. Atkinson*, (Baltimore) Am. Dermatolog. Assn., Baltimore, 1887.

This is a rational belief to hold, for it is well known from clinical experience that diseases differing widely in their manifestions can be due to one and the same cause, and, in the subject under discussion, experiment has shown that the same inoculation may develop either an erysipelas or a disease of widely different character depending upon, first, the seat of absorption; second, the strength of the virus; and third, the peculiarities of the patient. The influence of the seat of absorption is shown, for example, by its effect on the period of incubation as demonstrated in a series of experiments by Echalier[12] in 1890. He showed "the resemblance of so-called surgical erysipelas to inoculated erysipelas in the short period of incubation [average, thirty hours] while medical, or spontaneous, erysipelas has a much longer period, averaging one week." The effect of variation in the quantity of virus is shown by the experiments of Roger in 1891.[13] A virus, which at first could cause a typical erysipelas, was weakened by re-inoculation, when it served to produce a local abscess only. He states that "the streptococcus experiences no change of growth, but a great diminution of virulence, if one works on the serum of animals who have before suffered erysipelas. After four inoculations the growth of the streptococcus was not stopped, only, instead of erysipelas, a local abscess appeared." The modification of the disease by individual and racial peculiarities is illustrated by a statement of Dr. C. L. Stevens[14] in 1884. He saw in Turkey "many cases of idiopathic erysipelas, asthenic in character, and resembling typhoid fever so common in Oriental cities, though having a more favorable prognosis and a shorter natural history."

If we accept the unity of the bacteria of the several septic

[12] *Echalier*, "De l'incubation de l'érysipèle," quoted in Cent. für Bakt., 1890.

[13] *G. H. Roger*, "Propriétés bactéricides du sérum pour le streptocoque de l'erysipèle," 1890., quoted in Cent. für Bakt., 1891.

[14] *C. L. Stevens*, Med. & Surg. Journal, Vol. cxii., 1884.

processes, we have one explanation of their varying manifestations in variations in form or quantity of the ptomäines produced. A. B. Griffiths[15] has discovered in the urine of erysipelas an alkaloid which he names "erysipeline," but he has not determined if the micrococcus of Fehleisen produces the same when grown in tubes of gelatine. The manner in which these ptomäines are formed is not yet determined; they may be an excretion of the micrococcus itself, or they may be a decomposition product of the tissues in which it lives. Each cell of the living body is constantly undergoing a process of death and regeneration, during which a toxic substance is formed which becomes harmful to the body if the quantity is created in excess, or the power of elimination checked. This suggests an explanation of the diverse effects of bacteria, in that different tissues may have the property of producing different alkaloids in the presence of the same bacteria. When general infection results from a local disease, the symptoms are those of the particular alkaloid generated. For instance, some act especially on the heart and circulation, while others act principally on respiration.[16] In the case of erysipelas it is affirmed that "as a rule general infection of streptococci is not commonly found. It can be caused by them, however."[17]

But independently of the proofs of bacteriology, the connection between erysipelas and puerperal fever has long been inferred from their clinical relations. As long ago as 1874 a report by T. C. Minor[18] states that in his investigations "epidemic erysipelas was invariably associated with an outbreak of epidemic puerperal fever, or vice versa," and Fiessinger[19] reported in 1889 "an epidemic of puerperal

[15] *A. B. Griffiths*, Compte Rendu de l'Acad. de Sciences.

[16] *S. Arloing*, 1892, quoted in Cornil.

[17] *Pfuhl*, Zeitschrift für Hygienie, 1892.

[18] *Thos. C. Minor*, "Erysipelas and child-bed fever," Cinn., 1874.

[19] *Fiessinger*, "Note sur une epidémie de septicémie puerpérale d'origine erysipelateuse," 1889.

septicæmia of erysipelatous origin." On the other hand, this connection has been strenuously denied, and many instances of non-contagion after exposure quoted in evidence. Kime,[20] in 1888, in a paper entitled "Results of Erysipelas Complicating Pregnancy and Parturition," concludes that there is nothing in common.

The uncertainty of arguing from single cases is evident from the strange co-incidences so often seen in the physical world, and in medical matters this is increased by the unconscious bias of the observer. Medical reports are often valueless from the fact that the busy practitioner frequently has neither the time nor the training to make accurate observations, even if unprejudiced in his investigations. It is not sufficient to find *a* cause—it is essential to exclude all other causes to establish the etiology of a case. In some instances an attack of erysipelas is attributed to infection from another case of the same disease, without noting the occurrence of septicæmia before and after in the practice of the reporter, and, *per contra*, a puerperal septicæmia may be traced back to a remote septic origin, while an intervening erysipelas might lead another observer to ascribe it to a different cause.

The number of cases of pueperal erysipelas impartially reported seems very small, and this is due in part to the fact that a typical cutaneous eruption has been considered necessary for the diagnosis. The existence of infection without external signs was claimed by Winckel[21] in 1886, and the disease called by him "internal puerperal erysipelas;" and in 1890 two cases of acute infectious pneumonia of erysipelatous origin were reported by Mosny, as quoted before.[8]

Winckel reported that he had seen forty-two cases of

[20] *Kime*, Tr. Indiana Med. Soc'y, 1888.

[21] *Winckel*, "Zur Lehre vond em internen puerperalen Erysipel," Verhandl. des deutsch Gesellsch, für Gynäk., Vol. 1, p. 78, 1886.

erysipelas during pregnancy and the puerperal state, six occurring before and thirty-six after delivery. Of the thirty-six puerperal cases, twenty-eight began in the genitalia, two in the breast, and the remaining six in the face and scalp. These cases terminated as follows: In the twenty-eight cases having their origin in the vulva, there were twelve deaths; in the other fourteen there were two deaths. The high death rate shows the importance of the subject, and the small number of cases recorded leads me to report two cases.

The first is of interest merely as an instance of non-contagion. The patient was a Swede, aged thirty-five, in her fifth pregnancy, all but one of her previous deliveries requiring forceps. I had attended her in October, 1885, for a light attack of facial erysipelas, but did not see her again until the evening of February 13, 1886, when I found her in labor. The case progressed slowly until finally, the pains ceasing entirely, I applied forceps at four o'clock, A. M. of the fourteenth, without ether, and delivered a healthy child of eleven pounds weight, presenting O. L. A. The patient had had a chill the preceding day, and showed a marked erysipelatous blush on the nose at the time of labor. She had high temperature for five days, but no other symptoms, the disease assuming a light form and disappearing in a week. The child was well throughout. In this case there was every opportunity for a conveyance of the contagium to the genital tract, but no general septic infection occurred, and the facial erysipelas ran its course just as in any non-puerperal case.

The second patient was an American, twenty-one years of age, in her first pregnancy. She was of good constitution, of average height and weight, had never had erysipelas, and was perfectly well aside from the ailments incident to pregnancy. Labor began June 1, 1888, and during the forenoon of June 2 she was delivered, without instruments,

of a child weighing about eleven pounds. There was a slight, superficial tear of the perineum, exposing perhaps a square inch of raw surface, and not needing a stitch. For two days the case progressed normally, but on the morning of June 4, forty-eight hours after delivery, I found her with a high temperatnre and all the discomforts due to fever, but no tenderness or distension of the bowels. Lochia normal. An enema was given and measures adopted to reduce temperature. On a second visit the same day, I found marked redness and swelling of the perineal region, involving the labia on each side, and presenting all the characteristics of cutaneous erysipelas. At the same time the vaginal walls were dry, hot, and red as far in as could be readily seen. From this time onward the blush spread, accompanied with great infiltration of the skin and blistering over the nates. At first it spread most rapidly upward, until, on the sixth day of the disease, it had covered the entire abdomen front and back up to the level of the umbilicus, where it ultimately stopped. At the same time it had extended downward on both legs, having by this time reached about the middle of the thighs, and eventually covering the entire surface of both legs to the tips of the toes. From the commencement of the disease to the final disappearance of the redness and swelling, was a period of twenty-three days, during the first two weeks of which the temperature was almost constantly from 103° to 105°. There were no abdominal symptoms at any time, and no evidence of general septic infection. The child was put to the breast soon after its birth, and throughout the disease obtained a a moderate amount of milk, which, however, was not sufficient, so that partial feeding was adopted early. This programme was continued until the infant was five months old, when nursing was discontinued, and during all of this time the child was perfectly well, except for a transient diarrhœa caused by the surreptitious administration of oat-

meal. The child died fourteen months later of cholera infantum, but the mother has remained perfectly well to this day, having passed through a second pregnancy a year ago, without complications.

This patient presented a typical surgical erysipelas, starting in the perineal wound forty-eight hours after delivery. According to the experiments of Echalier, quoted above, the period of incubation of inoculated erysipelas presents an average of thirty hours, and, as the disease appeared in this case forty-eight hours after the formation of a wound, it is easily explained by direct inoculation. The patient was not catheterized, and my hands had not come in contact with her, except at the time of delivery; so that, if the poison was introduced by the hand of the accoucheur, the incubation period was exceptionally long. To discover, if possible, a source of contagion from a previous case of erysipelas or puerperal fever, I have examined my records for the preceding month, and find that on May 6 I attended a patient through an exceptionally easy confinement, who died May 10 of the most violent form of acute septicæmia — the only fatal case I ever had. From that date up to June 2 I had attended two obstetric cases, a case of fresh scalp wounds, and several cases of boils, bubo, etc., presenting suppurating surfaces, in none of which did any sign of erysipelas or septicæmia appear. During the balance of June, and while attending this case, I had five obstetric cases, two of them instrumental, and two miscarriages, in none of which did any bad symptom occur. One case of erysipelas did occur in a patient with a wound of the nose, who came under my care June 22, the blush appearing at the wound June 28th, thence spreading over the face, not invading the scalp and disappearing in six days.

In considering the puerperal case we are impressed, in the first place, with the fact that the disease was exceptionally severe, both in extent and acuteness. A report by Man-

fredi[22] and Traversa emphasizes the fact that "the gravest forms of erysipelas are not those which last the longest with circumbscribed areas, but those which present a large surface of invasion, as in traumatic erysipelas." In spite of the acuteness of the disease and the favorable opportunities for absorption, the case progressed exactly as if in a non-peurperal patient. A greater interest attaches to the possible source of infection. Inoculated erysipelas presents a short period of incubation, and, as a rule, shorter in the more violent cases, so that we might assume that the seed was planted about twenty-four hours after delivery. In that case it was probably derived, not from the physician, but from the unscientific handling of the nurse, who had used, I afterwards learned, some soiled cloths to bind upon the patient. Doyen, of Rheims,[23] who maintains the unity of the three streptococci of pus, erysipelas, and puerperal fever, says: "To-day the development of puerperal septicæmia can be put to the account of imprudence or negligence;" and certainly there were abundant opportunities for infection, for in 1888 there was not the scientific use of antiseptics in midwifery that obtains to-day. The occurrence of an extremely violent case of puerperal septicæmia, followed in twenty-three days by an equally violent and exceptional erysipelas suggests a possible connection between the two. The occurrence of nine cases of childbirth and miscarriage during the interval between the two cases and during the progress of the erysipelas, some of them involving extensive digital exploration of the uterus, but resulting in no infection, is evidence of negative value only.

A study of the literature of this subject impresses one with the necessity for, *first*, fuller reports of cases, with special reference to the existence of any septic disease in the practice

[22] *Manfredi & Traversa*, Ann. de l'Inst. Pasteur, 1888.

[23] *Doyen*, (Rheims), 1890, quoted in Cornil.

of the observer at the same time; *second*, further experiment on the duration of the vitality of the micrococcus when conveyed by hands, instruments and clothing; *third*, confirmation of either the specific nature of the streptococcus erysipelatis, or of its identity with the micrococcus of other septic diseases. Clinical as well as bacteriological evidence is needed to establish the practical point of defining the duties of the physician in the way of disinfection, or absolute avoidance of obstetric cases while attending septic patients. Laboratory work is necessarily confined to a few men, but every practitioner can report accurately his cases, and so aid in the solution of this most urgent and important point of practice.

ARTICLE IV.

THE TREATMENT OF PNEUMONIA.

By FREDERICK C. SHATTUCK, M.D.
OF BOSTON.

READ JUNE 13, 1893.

THE TREATMENT OF PNEUMONIA.

TWENTY years ago the profession generally held that croupous pneumonia is rarely fatal, except in the aged or in those whose constitutions are weakened by alcoholic or other excess. At that time the doctrine that the disease is a local inflammation of the lung, to which the general disturbance is secondary, was just beginning to give way to the view that the lung process bears much the same relation to pneumonia that the affection of Peyer's patches does to enteric fever. At present there seems to be a disposition on the part of some to return to the local disease doctrine, though, of course, in a different form, and to class pneumonia with diphtheria and erysipelas.

To-day there is certainly a dread of pneumonia among the laity, and, I think, the profession feels less confidence in the power of youth and vigor to withstand the disease than it formerly did. Has pneumonia changed its type in the last fifty or in the last five years? Has the resistance of the population diminished? These are questions which have been often asked. That which first led to their asking was the revolution in treatment, and particularly the abandonment of venesection. We wonder how our predecessors could have bled, purged and puked patients whose every scrap of strength we seek to save. But they also treated consumption antiphlogistically. As far as we can reason from analogy it does not seem probable that the disease has permanently changed character. We do not think that other specific diseases have so changed in this period. If they have changed at all they have become less rather than more fatal.

The valuable paper of Townsend and Coolidge[1] shows that in the Massachusetts General Hospital there has been a marked increase in the mortality from pneumonia; but that this increase, when carefully studied, cannot be attributed to the change in treatment, and probably not to any change in the disease itself.

It seems to me that factors which are very important, but which do not easily lend themselves to statistical inquiry, are the great change in the character of the population, or perhaps still greater change in its manner of life, both poverty and luxury having greatly increased; and the wear and tear of the nervous system incident to modern commercial and domestic methods, which has been multiplied many fold. Cities have grown large. The very poor have a better water now than many of the well to do had in the days of contiguous wells and privies. But it is far otherwise with the air, whether in or outside the house. I must not, however, pursue these questions further, though they have an obvious bearing on therapeutics and its results. And I can only allude to the influence of grippe on pneumonia. The former seems to prepare the way for the latter only indirectly by lowering the resisting power. Influenza thus renders a person more liable to pneumonia, and also probably diminishes his chances of recovery.

Pathology and therapeutics do not always go hand in hand. In some diseases our pathology is ahead of our therapeutics; in others the reverse holds true. We began to treat pneumonia as a general disease before we knew it to be such, and we were convinced that it must be such before we knew of the existence of the diplococcus or toxines and anti-toxines.

The fruit of bacteriological discovery is not yet ripened, though, as we shall see later, there is reason to hope that ripening may be in process.

[1] Transactions of the American Climatological Association, 1889.

As far as prophylaxis goes we cannot as yet accomplish much. We can caution convalescents from other and milder affections, especially during the season to which experience shows us pneumonia is most incident. We can warn our patients at these seasons not to treat lightly severe colds. We can "preach the gospel of hygienic righteousness," as the late Dr. George Derby put it.

No method of aborting the disease which has yet been proposed has made good its claims. Pneumonia, like typhoid fever, may abort spontaneously. But we cannot make it do so. Still, it seems to me that the method of Pétresco of Bucharest[1] is worthy of trial. Since 1883 he has treated 755 cases of pneumonia with very large doses of digitalis from the time they first came under observation. He gives for two or three days a strong infusion, and claims to be able to cut early cases short, and to influence very favorably more advanced cases. His mortality now is only 1.22 per cent. He gives from one to two drams of the leaves daily, the equivalent of one to two ounces of our tincture. In like manner we have had no distinctly curative treatment, though we are encouraged to hope that the injection of immune blood serum may prove to be such after further trial. In short, our efforts are at present confined to promoting the comfort of the patient, and conserving his forces in every way to enable him to outlive the self-limited disease. This in itself may be much.

For the better application of this general principle it will be more convenient to divide the disease into stages, remembering always that these divisions are arbitrary, and that nature does not seem to feel herself bound strictly to abide by them. Patients very rarely succumb to the stage of invasion or preliminary congestion of the lung with active implication of the pleura. The danger here is not of dying; it is rather of loss of strength, which may be sorely needed

[1] Bull. de Thérapeutique, 1892, p. 120.

later. The indication, therefore, in the ordinary case is to relieve the pain, to put the patient to bed and freely open the bowels, just as the mariner prepares his ship for an impending hurricane. The severity of the pain and any known or ascertainable peculiarity of the patient will decide the character and amount of the means for its relief. In the early days, at least, there can be no question of the safety of morphine, which should be used freely and frequently, hypodermically. Restlessness and an excited nervous system call for morphia nearly as loudly as does pain. Dyspnœa in the average case is at this stage due far more to the pleuritic pain than to the state of the lung. But now and then we see a case in which so much lung tissue is so rapidly invaded that the heart finds it difficult to adjust itself to the changed condition, and greatly oppressed breathing results. In such a case nothing gives such prompt relief as venesection, the freedom of which is to be proportioned to the age and vigor of the patient and its effect on the symptoms. With the veratrum viride treatment of the Philadelphia school I have no personal experience. If internal antipyretics are to be used at all in pneumonia it is only during the first stage that they are admissible. I am no friend of them myself, and never use them in this disease. Even the best of them is somewhat depressing to the heart.

During the prevalence of the old doctrine of the nature of pneumonia and of inflammation, treatment was naturally addressed to the diseased organ, and antiphlogistics were used externally and internally. We now recognize the fact — or believe it to be a fact — that the cause of death in the second stage is rarely asphyxia as a result of the amount of lung involved. The loss of function of a portion of the lung plays in most cases a rôle which is quite subordinate to that of cardiac exhaustion, dependent probably on the influence of toxines on the innervation of the heart rather

than on changes in the myocardium. That it is mainly a toxæmia which weakens the heart and not simply the mechanically increased resistance in the right chambers, seems to be proved by the great fall in the pulse, as well as the breathing, coincident with crisis, although the physical signs over the affected lung area may show no appreciable change.

It is then the maintenance of nerve force which we must try to secure. This means the avoidance of every unnecessary fatigue and the administration of the largest amount of the most nutritious liquid food which can be digested, with free ventilation of the apartment. It seems to me that the poultice and the envelopment of the chest in cotton or wool are relics of the old pathology. The poultice is the worse, as its frequent change involves notable fatigue and its weight is not insignificant. I have no experience with the application of ice, which seems to be gaining favor in this country after long use in Germany, to which country we are more apt to look for pathological than for empirical therapeutic suggestion. With regard to food and feeding I do not propose to go into any detail. But I do want to enter a plea for greater freedom of ventilation than is generally allowed. Here again the old pathology seems to me still to influence the medical as well as the lay mind. I am convinced that courage in facing popular prejudice against cold air, and less reverence for the seventieth degree of the thermometer would subserve the interests of our patients and diminish the bills for oxygen. If I should be so unfortunate as to contract pneumonia I trust that my doctor will put me in a sunny room and give me the benefit of a combination of open fire and open window. It is not pleasant to be accused justly or unjustly of killing our patients, and I must plead guilty, I fear, to a lack of the full courage of my convictions on this point. In the case of a very rich man whom I saw repeatedly in consultation last winter, and who

wished no expense to be spared, I soon found that it was useless to try to get a window open. Nor did I succeed in getting even an open fire. But cylinder after cylinder of oxygen was breathed with avidity.

The use of morphia in the first stage has been already touched upon. Experience is leading me to think that it should be used more freely in the second stage than is customary. Here it is not called for by pain so much as by restlessness, cough and sleeplessness. In any given case we must try to estimate the proportion of danger from respiratory failure. The smaller this danger the more freely can we use morphia, which will do more good in resting the nervous system than harm in other ways. And even in cases where the danger of respiratory failure cannot be disregarded, but morphia is indicated on other grounds, I believe that the inhalation of oxygen enables us to give morphia when we might otherwise feel compelled to withhold it. With oxygen of late years I have had considerable experience. I have seen it given freely and without regard to expense. But I can recall only one case in which I feel reasonably convinced that it saved life — that of a Harvard student whom I saw with Dr. Hildreth. Even here we had to deal with a patient whose age should have ensured his recovery according to the books. In many cases I have seen it give marked relief. Our expererience with this gas is now sufficient to enable us to estimate its value better and to use it more intelligently than a few years ago. Physiologists kept it out of use longer than we should have allowed them to do, telling us that the consumption of oxygen is no greater when the pure gas is inhaled than it is under ordinary conditions. Even if this is true of the well, it does not follow that it is also true of the sick. I suppose to-day clinicians are agreed that oxygen may be useful when a sufficient amount of air to arterialize the blood is prevented from reaching the alveoli, a condition which is present in some cases of pneu-

monia as the result of excessive secretion in the bronchial tubes in combination with the lung consolidation. Cyanosis is therefore the best single indication for oxygen. In such cases it should be used early and as freely as the purse of the patient will allow. Unfortunately it is still a very expensive remedy. But it is my feeling that its usefulness is wider than would appear from the above. I think I have seen refreshment, quieter respiration, a fuller pulse, and diminished restlessness, perhaps sleep, follow oxygen, even where cyanosis was absent or slight. I have asked myself the question whether the gas may perhaps act as an aid in the combustion of toxines, all compounds of unstable character I believe. The other chief means of stimulating the flagging heart, as reflected in the pulse and the character of the sounds, are alcohol, strychnine, cocaine, digitalis, and other heart tonics. I shall not delay to speak further of alcohol, as I think we are all pretty well agreed as to its usefulness and the indications for its employment. Strychnia has grown in favor of late years, and I think justly. It is best given hypodermically, and, in severe cases, to the limit of toleration — $\frac{1}{20}$ – $\frac{1}{40}$ of a grain every three or four hours. H. C. Wood speaks highly of cocaine as an adjuvant to strychnia.

All writers advise and all practitioners use digitalis or one of its congeners if there are any indications of a failing heart. I have so used it constantly, but must confess that I do not feel perfectly clear as to its usefulness as it is ordinarily given. Perhaps we do not use it in large enough doses. I am sure that we should use it hypodermically more than we do. I have this year seen prompt and distinct effect in several cases follow hypodermics of thirty minims of the tincture. Pétresco's results are confirmatory of the idea that our doses of digitalis are often insufficient. An editorial writer in the Therapeutic Gazette, in 1892, in speaking of Pétresco's paper, which he evidently did not

read with care, thinks that pneumonia must be a different disease in Roumania from that which we see, and that the digitalis must be of poor quality. The first supposition is highly improbable, and Pétresco has anticipated and answered the second. He notes repeatedly a pulse rate of 36 to 48 within thirty-six to seventy-two hours after the digitalis is begun, and has supplied himself from the best houses in Paris and Berlin as well as from native sources.

With the cold bath and cold wet pack as remedies against high fever, delirium, and other nervous symptoms, I have no personal acquaintance. A period of the disease which we all recognize as one of much danger in some cases is that immediately following the crisis. Exhaustion or collapse at this time calls for rapid stimulation; alcohol and ammonia internally, heat to the surface, brandy and ether under the skin.

In cases terminating by lysis, and in delayed resolution a supporting treatment is to be carried out according to the indications presented by the case in hand. The frequency of empyema as a sequel to pneumonia is never to be forgotten, if for no other than a therapeutic reason.

Lépine[1] has recently employed with success injections into the thighs or arms of oil of turpentine, when he feared that grey was passing over into yellow hepatization. Fochier first suggested and practised this method in puerperal septicæmia, having noticed that improvement took place when a focus of pus was established. The turpentine produces an abscess — "of fixation," Fochier terms it — which can be opened later. Dieulafoy and Bard[2] have each practised this method in pneumonia, with recovery in both cases. Others in France have also used it a few times, but I have not been able to get access to the journals in which the reports appeared.

[1] La Semaine Médicale, 1892, p. 77.

[2] Lyon Médicale, 1892, p. 533.

In three desperate cases in my service at the Massachusetts Hospital this winter I had turpentine injected, in one case on the 9th, in two on the 7th day of the disease. All three died, as seemed certain that they would, whatever was done or not done. I do not think that these cases should really count for or against the method.

For therapeutic purposes cases of pneumonia may be divided into three classes. First in frequency are those cases which will recover under any treatment or no treatment, unless they are grossly mismanaged; second, those which will die in spite of any and all treatment known at present; third, those in which judicious treatment may turn the scale.

Our object is constantly to strive to enlarge the third class at the expense of the second. Thus far, our efforts have been unsuccessful enough, it must be admitted. But, however skeptical we may be, we should not be hopeless, or refuse to listen to those who bring forward new methods with an underlying basis of reason and fact. One method of curative treatment has been recently introduced which can claim an encouraging though limited success in practice, as well as foundation in analogy—with tetanus, for instance. Only one case has been reported thus treated in this country, but it would seem our duty to lose no further time, and I propose to test the method in my wards next autumn and winter.

I refer to the injection of blood serum from a human being who has recently passed the crisis of pneumonia, or blood serum or fluid derived from animals rendered immune to experimental pneumonia by the injection of pneumococcus cultures. I will not take your time by going into the details of this method and its technique. The articles of the Klemperers,[1] and others in Germany and Italy who have tried

[1] Berliner Klin. Wochen., 1891, p. 833, and Wiener Med. Wochen., 1892, No. 22, Niesser; Deutsch. Med. Wochen., 1892, p. 593. Lara; Wien. Med. Wochen., 1893, No. 12. Bozzolo, ibid.

it are accessible enough. Suffice it to say that the purpose is to induce the crisis artificially, and that of thirty-nine cases thus treated, collected for me from literature by Dr. R. C. Cabot, all save one recovered. Whether the pneumotoxin and antipneumotoxin theory of its mode of action is final or not, remains to be seen. In the sole American case[1] defebrinated blood was used with results which do not encourage a second trial.

DISCUSSION.

Dr. William Osler, of Baltimore, Md. — One of my chief reasons for coming here to speak on this old-time subject of the treatment of pneumonia was to express, in a way, the general acknowledgment which the profession has made to the Massachusetts Medical Society for the rational treatment of pneumonia. It may not be known to all of you that rational therapeutics in this country took their origin in this society, largely owing to the treatment of Dr. Bigelow, whose essay on the self-limitation of diseases had such influence, and, in part, owing to the students of the great Louis in this country, notably Dr. James Jackson, jr., Dr. Shattuck and Dr. Bowditch. Dr. Holmes is, I believe, the only survivor. But those men learned a lesson in Paris which some of us never knew, that the beginning of the knowledge of the therapeutics of a disease is a knowledge of its morbid anatomy and of its pathology. It was really owing to the work of these men that more rational measures were introduced, first in pneumonia, then in other diseases. There is an interesting essay on the treatment of pneumonia, published thirty years ago by the late Dr. Dixon, of Charleston, a very brilliant man. It is very interesting, inasmuch as he has published enormous statistics from different sources, viz., hospitals, poor houses, private cases, and all sources, and he came to the conclusion that, so far as statistics go, they show that none of the different forms of treatment

[1] Hughes and Carter, Therapeutic Gazette, October, 1892.

much affect the mortality, amounting in his total statistics to about 25 per cent. Now, a mortality of that height is, I should say, not excessive even in private practice, not excessive in some hospitals, and in some of the large city hospitals the mortality reaches a still higher percentage, from 25 to 35 per cent.

I have only one or two points to speak of in reference to the treatment. In the first place pneumonia is a specific disease, a self-limited disease, and as far as I know I agree with Dr. Shattuck that we have no specific treatment. The indications for treatment are entirely symptomatic. They first relate to the local character of the disease. There are two groups of symptoms which it is important for me to speak of briefly and separately. I may state that a considerable portion of the cases of pneumonia requires no medicinal treatment. It is my invariable custom, particularly in hospital practice, where we have to treat the patients alone, to ask myself the question in dealing with a case of pneumonia, Does this man require medication? Does he require only careful nursing and careful dieting? And in a very considerable number of cases of healthy young adults I never give medicine. I have had a number of instances in the past three months where the disease has been treated to termination without a dose of medicine, the same as we treat typhoid fever. Of course these cases are so treated because, after all, the treatment by diet, rest and nursing is the most essential. With reference to the treatment of the local condition, viz., the lung, pain is a symptom which demands immediate relief, and should be relieved by morphia, or, as I prefer, by Dover's powder; at the same time, if the pain is very severe, by local bleeding or cupping. The early dyspnœa is, I think, best combatted by venesection, and during the first three or four days of a pneumonia if the cyanosis is advancing, and if the patient is robust or young, bleeding from 15 to 30 ounces will, as a rule, do good. Then, secondly, we have to do with the toxic symptoms, and it is with these cases that our treatment at present is almost hopeless. The great majority of deaths result from poisoning. We have no specific to meet it. Undoubtedly the great majority of these cases die with enfeebled hearts due to the toxic action. Twenty per cent. of the cases seem to be in the hands of

the physician; there is another 20 per cent. where we can do no good, and in the other 60 per cent. is where it lies with nature; we think it lies with us, but it lies with nature.

Dr. G. K. Sabine, of Brookline.—When the tremendous mortality from pneumonia is taken into consideration we realize that the reader could not have chosen a more important subject for his paper. For instance, in 1892, last year, in the city of New York, 13 per cent. of all the deaths were due to pneumonia; in Brooklyn, 11 per cent. During the first three weeks of March more than 23 per cent. of all the deaths. The mortality may have kept as large later, but I have not seen the figures. In other words, one in every four who died died of pneumonia. Even as late as this many deaths are reported in Boston from this disease, the mortality last week being 214, twenty-five of whom died of pneumonia.

It seems to me that in considering the subject of treatment the age of the patient should be taken into consideration, as the diagnosis and the intensity of the disease follow certain rules in relation to age. For instance, with infants and young children up to the age of three or four years pneumonia is more or less fatal; with very young infants it would seem we should keep back our prognosis, as their stomachs are so liable to be upset, and it is much safer to depend upon foods and stimulants alone. I have always been accustomed to treat cases of pneumonia in infants and also very acute cases of bronchitis with nothing else. Of course there have been some exceptions. Older children, that is from four years old to fourteen, and perhaps older, most always get well, no matter what is done. Therefore, it seems a pretty safe rule to follow to feed them and keep them comfortable. Just how long that age of safety lasts I do not know. With regard to food, the reader mentioned it, but not did lay much stress upon it. It is surprising in this disease, especially with men, what enormous amounts of nutriment they can take. I remember one patient, a man, who took within twenty-four hours over 2½ gallons of milk, 9 raw eggs, and ¾ of a pint of brandy. It is only fair to say that he was a drinking man. We are all agreed on food and stimulants. Stimulants must be given as required, early and freely, according to the condition of the patient.

No fixed rule, of course, can be laid down. One drug which I think of great use in the treatment of the disease, which I have not heard mentioned, is carbonate of ammonia. I fancy all practicioners give their patients ill with pneumonia this drug. Where it does not bother the stomach it is certainly of great use, and should be given in frequently repeated doses if given at all. In regard to poultices, I know they have been given up by the majority of physicians, but there are instances where they do good; at least, patients say so, where there is great pain. I have in mind one or two instances where I think pain was thus controlled where subcutaneous injections of morphia failed. I do not think there is any danger in the first stage to give opiates, if not used too frequently, and I prefer the liquid Dover's powder. It can be administered by the nurse and is a very convenient form. In regard to antipyretics, it seems to me safer to get along without them. Of course, it is not always easy to say whether we have a commencing case of pneumonia to treat or grippe. I have no doubt that a great many cases that have been reported as following grippe were really pneumonia from the start. Not all cases of pneumonia show physical signs at first, or for two or three days. We see a patient with high fever, pains in the bones, rapid pulse, and at once we make a diagnosis of grippe, when two or three days afterwards it is discovered that we have a case of pneumonia to treat. I have not had much experience with oxygen. I have yet to see a case where it did good. It is a relief to the friends. You are doing something. Recently I took care of an intelligent man, who subsequently died of pneumonia, and gave oxygen without asking any questions. He said he got no good from it. The question has never been asked properly, Can oxygen do harm? It has occurred to me that it could, by drying up the secretions and in the long run increase the dyspnœa instead of relieving it. As Professor Osler has said, many cases require no medication. In a large number of cases I give none unless it is some placebo or some stimulant.

Dr. A. L. Mason, of Boston.—I have very little to add to the discussion. In this disease we are reduced chiefly or entirely to the expectant method, dealing with each case

according to its special indications. The number of cases which present themselves at the Boston City Hospital is very large, and I will simply refer to one or two points which my own personal experience recalls. The house physicians, Drs. Emerson and Hardon, have within a day or two tabulated the cases which have come under my care within the past year, and have classified them according to age, habits, health, general condition, and sex. Females are not very subject to pneumonia, about one in ten of my cases, and when they do have the disease, their habits being better than those of males, they stand a better chance of recovery; but the danger from pregnancy we see sometimes, and that complication is very fatal. During the past year I observed two cases of pneumonia with pregnancy, of which one resulted unfavorably, the patient also having measles. The other woman, about 30 years of age, made a good recovery without aborting, though pregnancy was well advanced. I saw six cases in children from three months to six years. My experience has not been that of Dr. Sabine's, that children under two years die very frequently with this disease. In fact I have never seen a child under two years die of lobar pneumonia. One child of five had an empyema as a sequel. Children and young adults almost always get well, even if their habits are not good. Six men from 50 to 66 years old got well with little treatment, being of previously correct lives; but two similar cases at 65 and one at 70 died. The rare occurrence of pneumonia in females is difficult to explain under the theory that it is purely an infectious disease, and that the weather and climate have nothing to do with it. It seems to me that there are other causes at work, and that we must regard exposure and inclement weather as being the exciting influence in a large number of cases. The occurrence of delirium tremens in pneumonia is often observed. This year for the first time I saw two cases in which this complication developed after the crisis in pneumonia. These two individuals got well.

The treatment has been so thoroughly considered that I shall not dwell upon it any further. Dr. Emerson has drawn up a table of 31 cases of pneumonia treated between January 1 and June 1 with inhalation of oxygen. There were only eight recoveries. All were bad cases, several dying within thirty-six hours after entrance, but in most of

them oxygen was given in quantities of from three to four hundred gallons within a few days. My own experience with this agent is very much like that of the gentlemen who have spoken. It is uncertain, and we can place no great confidence in it. Some patients object to it, because it interferes with their respiration. They experience no relief and are made more uncomfortable by its use. Others experience comfort and satisfaction, become less cyanotic, and in a few cases it seems to me to have turned the scale.

ARTICLE V.

HOW SHOULD THE GENERAL PRACTITIONER DEAL WITH STRANGULATED HERNIA?

By ARPAD G. GERSTER, M.D.
OF NEW YORK CITY.

READ JUNE 13, 1893.

HOW SHOULD THE GENERAL PRACTITIONER DEAL WITH STRANGULATED HERNIA?

The cardinal condition for the successful treatment of strangulated hernia is an early diagnosis. I wish to call attention to the frequency with which, during the prevalence of gastro-intestinal disturbances in the summer months, the presence of a strangulated hernia escapes the notice of the overworked practitioner. Within my own experience a number of such cases have occurred where the suspicion of intestinal obstruction first arose on the appearance of fæcal vomit. Indeed, the rule to examine the groin, during any intestinal disturbance associated with persistent vomiting, should be invariable. The presence of diarrhœal or solid stools should not militate against this rule, as we know that strangulation of a hernia will frequently occur during the progress of an enteritis. I have also seen fatal errors committed by the mistaking of a small, incomplete, but strangulated hernia for a mass of inflamed lymph-nodes. Finally, I remember the case of a young man suffering from recent gonorrhœa, who, while vigorously rowing, slipped and fell backward into the boat. He instantly noticed a severe pain, which he referred to one of his testicles. The family physician found an intumescence of the scrotum, and unhestitatingly diagnosticated orchitis. Unfortunately this diagnosis was insisted on for five days, in spite of the grave and unusual symptoms which accompanied this supposed orchitis. When fæcal vomiting had set in, herniotomy was performed. The gut was found to be gangrenous, and the boy died. In the presence of any tumor of the localities where herniæ are wont to appear, whenever persistent vomiting occurs, the

benefit of the doubt should be given to the assumption of hernia. In those cases where the physical characteristics of hernia are uncertain, an exact diagnosis should be arrived at even at the cost of a probatory incision.

It would transcend the limits of a brief paper to discuss all the methods which have been successfully used for the reduction of strangulated hernia; but so much may be said, that in the same ratio as the safety of herniotomy has increased, have the limits of permissible taxis decreased.

In attempting taxis we must observe, that unless the patient can manage to be perfectly passive, general anæsthesia should be employed. The longer the strangulation has existed, the more unlikely it is that favorable conditions will be present. Local inflammation will have set in, rendering the patient intolerant of manipulation; and the presence of a more or less copious effusion in the sac will rob the operator of the chance of manipulating the gut itself, the effusion acting as an interposed elastic cushion. To replace the protruding gut our efforts should be directed towards the neck of the hernia.

The patient's posture is also important. Elevation of the pelvis will be useful. Another expedient may be mentioned by which I have prepared a strangulated hernia for reduction. I mean the application of intense cold in the form of an ice-bag, or the evaporation of ether poured on the swelling, drop by drop. The local pain is markedly reduced, the intumescent parts shrink, and reduction often becomes astonishingly easy. Force should never be employed, as it will not accomplish replacement, but will often, especially when strangulation has for some time existed, result in serious damage to the gut. A case in point is that of a young man who contracted hernia, which immediately became strangulated. The physician in charge attempted taxis five hours after the occurrence. So much force was used, that when I saw the patient six hours later, the scrotum, penis and

groin were extensively ecchymosed. On herniotomy it was found that the peritoneal covering of the strangulated gut had been ruptured and stripped up for a considerable distance. The convexity of the viscus was necrosed, and an artificial anus was established. The man died of septic peritonitis. Another adjuvant of reduction is the hypodermatic use of morphine, which, however, should be employed sparingly and with discrimination and only as a preparatory measure for taxis. Otherwise it is apt to mask the more salient symptoms of strangulation, lull patient and physician into a false sense of security, and lead to incalculable mischief.

Permit me to call your attention to a point of great importance in estimating the urgency of a given case. Recently acquired and, especially, femoral herniæ are often characterized by great intensity of symptoms, mostly due to particularly firm constriction or strangulation. In these cases severe local pain is the rule, vomiting is incessant and projectile, remissions are few or absent, and all the characteristics of the disturbance are decidedly *progressive*. The integrity of the gut as well as the resisting power of the patient are rapidly being undermined, and immediate relief is imperative.

To point out the contrast I shall mention a type of strangulation which is at first comparatively mild, and where the term "strangulation" is not strictly applicable, as the stenosis of the viscus is usually due to sharp flexion on account of the repletion of the prolapsed gut with liquid or solid contents. Here the tumor is not so acutely painful as in the former class, vomiting is infrequent, intervals of several hours (up to twelve) occurring, the length of remission depending on the amount of food ingested. Ultimately a hernia of this kind will lead to general exhaustion and gangrene of the intestine, though the progress of the malady is much slower. Aside from gut I have found strangulated

herniæ containing (twice) a grangrenous vermiform appendix, the ovary, an infantile uterus, a diverticulum of the bladder, and in one instance, imbedded in an abscess, a foreign body (a fish-bone), which had apparently perforated the intestine of the hernia prior to strangulation.

A safe and well-tested working rule in dealing with strangulated hernia of recent occurrence is to attempt gentle taxis; should this not succeed, to propose to the patient taxis in anæsthesia, with the proviso that if this miscarry herniotomy should be immediately performed. Before anæsthetizing, everything should be prepared for the operation in order to save time and to save the patient a second narcosis. In the presence of fæcal vomiting it is desirable to empty the stomach by gastric syphon before anæsthesia; otherwise the putrid matter vomited during operation may enter the air-passages, causing suffocation or septic pneumonia.

The choice of the anæsthetic will also deserve some attention, chloroform deserving the preference, especially where pulmonary or renal disease coexists; ether, on the other hand, being preferable in the presence of cardiac weakness. Where the patient is very much exhausted it might be found advantageous to eschew general anæsthesia, and to perform the operation under cocaine, ether spray, or even without local anæsthesia.

There are on record a certain number of cases of successful taxis in which the reduction of the strangulated gut was undeniably made possible by preceding puncture and evacuation of liquid fæces. I have never consciously employed this treatment, deeming it more hazardous than a well-performed herniotomy.

As regards the technique of herniotomy, I do not propose to dwell upon the minute detail of the procedure, and shall content myself with emphasizing two points, the observance of which goes far in rendering the operation successful.

The first of these points is the observance of the *strictest cleanliness* or *asepsis*. Difficult as asepsis is where the abdominal cavity is invaded, it is rendered much easier by the topographical peculiarities of a wound in this region, as long as the gut is not gangrenous. The operation is practically extra-peritoneal, and infection must be gross indeed to result in peritonitis. Careful shaving of all the pubic hair, a thorough scrubbing with soap and water, followed by rinsing of the entire field of operation with a strong solution of corrosive sublimate, are conditions easily fulfilled. Instruments and dressings, the latter consisting of any available textile fabric, can be promptly sterilized *ex tempore* by a short boiling in a watery solution of washing soda. The vessels found in any kitchen will answer perfectly. For sponges wads of absorbent cotton or of the dressing material can be used. The towels to be employed about the field of operation should also be subjected to a similar boiling. I may safely express the opinion, that a thorough scrubbing of the surgeon's hands with soap and brush in hot water, followed by careful scraping of the nails and a short immersion in mercurial solution, will insure a very efficient degree of asepsis.

As to the incision, I have to say only, that it should be ample, the upper angle of the wound extending well above the inguinal ring. Bleeding vessels should be promptly tied, and the sac cautiously opened at a place where fluctuation is apparent. This precaution will insure against wounding adherent gut. The sac should be split well up to its neck and then the contents should be carefully examined *in situ*. Should grangrene not be present in the visible intestine it may still exist at the site of constriction. To permit of a safe inspection of the constricted part of the viscus, the constriction must be relieved not by blunt attempts at liberation but by *dissection from without inward*, this being the second point to be emphasized. The old

and classical method of dividing the constricting fibres from within outward under the guidance of either a finger-nail or a grooved director is dangerous, especially where the gut has been irremediably damaged by prolonged strangulation. A much safer procedure is the division of all confining fibres by the knife, wielded under the guidance of the eye. Injury to an abnormal epigastric artery will thus be easily avoided, or, should it be unavoidable, the vessel can be readily secured. As soon as the strangulation is relieved, *and not before*, the gut can be gently withdrawn and examined; should it be found healthy it can be immediately replaced. If its appearance is doubtful a fillet of silk can be drawn through the mesentery and the wound covered with a wet dressing. Within six hours an examination should be made, and if the gut is then found healthy, it may be replaced. If gangrene is undoubtedly present, and fæcal vomiting or other urgent symptoms do not compel the establishment of an artificial anus, the intestine should be left unopened. Often the gangrene is very limited; and in these cases the gangrenous area can be inverted, and the healthy visceral peritoneum brought together over it by a longitudinal row of Lembert sutures. Should it become necessary to establish an artificial anus, two things must be carefully seen to; first that the last trace of constriction has been relieved, and, secondly, that a dam consisting of a light packing of iodoform gauze, slipped into the peritoneal cavity around the gut, corresponding to the neck of the hernia, should prevent the influx of fæcal matter.

It would transcend the limits of this paper to discuss the question, "When should an incision of gangrenous gut be practised, followed by intestinal suture?" or, "When shall the establishment of an artificial anus receive the preference?" Furthermore, I will abstain from considering when and how a radical closure of the inguinal canal should follow herniotomy. In concluding these desultory remarks I shall say:

(1) In case of uncertainty give the benefit of the doubt to the assumption that an obscure tumor of the groin is a hernia.

(2) Be gentle in attempting taxis, and do not spend too much time over it.

(3) Be thoroughly aseptic in heriotomy, and divide the constricting bands freely, not with probe-pointed knife cutting from within outward, but with the scalpel under the guidance of the eye, from without inward.

DISCUSSION.

Dr. C. C. Odlin, of Melrose: It has always seemed to me that he who participates in a public discussion, even if he be devoid of the necessary oratorical accessories to hold the attention of his audience, should at least have a thorough knowledge of the subject under consideration. This I must at once disclaim. It has seemed to me perhaps that the only reason why Dr. Porter asked me to take part in this discussion was that the words of wisdom which we have heard might shine more brilliantly in comparison with my ignorance; but if that be the case I shall endeavor to forgive the doctor, and try to make some remarks on the interesting paper which we have heard from Dr. Gerster upon how strangulated hernia should be treated by the general practitioner from the standpoint of a general practitioner. I remember very well indeed, with what a sinking of the heart I was in the habit in my early days of responding to a call to see a person afflicted with irreducible hernia. I revolved in my mind the different coverings of the hernia—integument, intercolumnar fascia, fascia propria, etc.,—and by the time I got to the house those were a muddle in my brain. That was all nonsense; I know now it was, but I didn't know it then. Had I known it then, I should have been saved a good deal of mental anxiety and worry. It seems to me that when the general practitioner is called to a case of hernia he should go to that case with just two ideas

in his mind; one is to reduce the hernia without operation if possible, the other is to reduce that hernia any way. Of course, we all understand that taxis is the first thing to attempt. Taxis, it seems to me, should not be prolonged, and should not be severe, lest the subsequent bruising may interfere with the recovery of the patient if operation be finally necessary. Taxis may be assisted very much by the use of ether and the ether spray; and it seems to me also by placing the patient in the Trendelenburg position. If my memory serves me aright, this was first attempted by Dr. William J. Allen, a practitioner at White River Junction, Vt. He mounted the bed, lifted the hips and body, and allowed the head and shoulders to rest on the bed. The gut returned with that gurgle which is so pleasant for the practitioner to hear.

If taxis is unsuccessful, of course the question of operation at once comes up. I want to speak of three points which have occurred to me in the cases upon which I have operated. One is the point Dr. Gerster has spoken of: to be sure of the diagnosis. Quite a number of years ago a gentleman who was a patient of mine a long time, came into my office and showed me a very small bunch about the size of a pea in the left groin. I examined that as carefully as I could, and told him I was unable to determine whether it was the commencement of a hernia or whether it was an inguinal gland. As this gentleman was going into the city every day, I asked him to call upon a surgeon who made the subject of hernia a specialty. A few days afterwards he came to my office and said he had visited the gentleman, and had been told it was an enlarged gland and that no truss was necessary. Nearly a year later, while getting out of his buggy, this little bunch broke through, forming a protrusion about the size of a hen's egg. I was summoned immediately, and found it impossible to reduce it. As I was called in the late evening, I packed the tumor in ice, thinking the cold, perhaps, would enable me to reduce it when morning came. As it was impossible to do so, I operated the next morning. There was no difficulty at all in returning the hernia; but the gentleman sank and died, apparently of exhaustion. That is a case in which I have felt, had I been acute enough to have distinguished that hernia in its commencement, a human life might have been saved.

Another point I wish to touch on may be spoken of perhaps in connection with another case. I was asked to see a woman about thirty years old afflicted with strangulated hernia. I advised immediate operation, and operated. The bowel moved freely after the operation, but the woman commenced to vomit; and she died, I think, on the fourth day. It seems to me, in the light of later experience, that the proper thing to do in a case like that is to perform laparotomy, feeling that there might be some obstruction farther up the intestine.

The last point that I will speak of is, that I do not think any one should hesitate to operate, no matter how unfavorable the conditions may seem to be. Some time ago, one hot day in July, I was asked to see an old woman of Irish extraction, about seventy years of age, as near as I could tell. I found her in a hovel of two rooms, surrounded by pigpens; hens were kept in the back part of the house. The room in which she lay was infested by hen lice. She had been vomiting four days at the time I saw her. I found a hernia about the size of the two fists. It seemed, certainly, as if no operation could benefit that woman; but I thought it my duty to give her what chance there might be. I endeavored to render her as aseptic as possible, etherized and operated. On getting down to the constriction, I found, in order to return this enormous mass, I had to cut to such an extent when the bowel was returned and the finger was removed, that the whole contents apparently of the abdomen poured out again. I never had such a condition before, and hardly knew how to proceed. I took a needle and silk, and sewed up the constriction, getting tissue from the internal iliacus muscle in which to catch my needle. The old lady was out in about a fortnight feeding her pigs; and since that experience I have felt that there are no conditions, no surroundings so bad that any physician should hesitate to give any patient the benefit of an operation.

It has seemed to me that there is no class of cases in which we have our surgical landmarks so clearly defined as in hernia; and I believe that any general practitioner with a cool head, a fairly steady hand accustomed to the use of the surgical knife, and a clear conscience should not hesitate to operate upon a case of strangulated hernia, and that it would be criminal to allow a patient to die because a professional surgeon was not within reach.

Dr. William Bass, of Lowell: I appreciate very much the paper we have heard to-day, and there is not much left for me to say. The ground has been very well covered. From that paper it seems we have a right to infer that we are all experts in the matter of surgery and in operating on strangulated hernia, which unfortunately is not the case. I will admit that our school educates every young man in a manner that he should be competent to deal with strangulated hernia; but there are some of us a little timid, and we are not all located near the city or near some expert man in the matter of surgery, and we might have to rely, in some back town or some wood-chopper's camp, upon ourselves. Now what will such a man do? Of course, when he undertakes the practice of medicine and surgery, he assumes that he is competent to attend to the business. Now then, of course, he understands the anatomy of the case and has seen the operation done; but he never was called upon to do it himself. This is his first opportunity; and what shall he do? Perhaps he may be by candle-light in a hut. He has got a difficult task for himself; but there is only one thing for him to do. He cannot retreat. He must operate if he cannot reduce it with taxis and under the influence of ether; consequently he makes the best of it. If he has nothing but a pocket-case, he proceeds with that; and in these times he must make his patient as near aseptic as possible and himself and the surroundings, which might be a difficult matter to do. Well, of course, he must operate under the circumstances; and if he is of the character of a man I met the other day, he will do very well. I will mention the case, though it is a little off from the subject. I was notified that I was wanted to bring my tracheotomy tube, and I hurried as much as I thought necessary; and when I got to the place I found the young doctor in attendance had already operated. As luck would have it he had left his pocket-case at home. Some man about the house had a pocket-knife, and that was dull. They sharpened it; and the doctor took the pocket-knife, and opened the trachea and found he had no tube. They found a piece of rubber tubing, and that he inserted. Now then, if our country doctor is of that character, he will get along very well; and, of course, a general practitioner must of necessity, if he is going to make a success, be an all-round man, be a man prepared for emergencies. A specialist, if

he is not a very smart man, can make a good practitioner of himself in some specialty. He has not so much ground to go over; but a general practitioner needs to be an extra smart man. As I said, I had not much to say; I wanted to help out this man in the backwoods a little. Now then, after he has operated, if he finds the gut gangrenous, about the best he can do is to make an artificial anus; and at some future time some man of more skill, or with assistance, can resect and remove the portions of the gut that are gangrenous and bring the intestine together and make a whole alimentary canal again.

Dr. H. H. A. Beach, of Boston: I have listened to Dr. Gerster's paper with the greatest possible interest. In twenty-six years' work in private and consultation practice and in hospital service I have seen most of the emergencies, most of the conditions that Dr. Gerster has spoken of. One great thing that has impressed itself upon me is the importance of an early diagnosis, an avoidance of excessive taxis —just the two main points Dr. Gerster has laid most stress upon; and I should hope he would have the thanks of the Society for laying aside the traditions of obsolete surgical work and really bringing the technique of the operation for herniotomy up to the standard of modern abdominal surgery. The essential points are—early diagnosis, avoidance of excessive taxis, prompt operation, and restoration of the gut to the abdominal cavity without pulling and hauling, which can only be done by free and adequate surgical incisions, and the most complete antisepsis that is possible. It seems to me he puts the operation right on a line with the prompt and adequate treatment which can be applied to extra-uterine pregnancy and to appendicitis. Prompt action is the only thing that insures success. The disasters of the three diseases may be nine times out of ten attributed to delay in diagnosis, delay in operation, insufficient antisepsis and undue manipulation of the parts.

Dr. John Homans, of Boston: I am sorry to say I did not hear Dr. Gerster's paper, so that I cannot speak of the points he made. The subject, as I read it, was how should the general practitioner deal with strangulated hernia. I

suppose the general practitioner in a case of strangulated hernia has got to act according to his ability. He must, if he is capable of doing it, operate and return the intestine if it is in good condition, and try to cure the hernia at the same time. It seems to me that a general practitioner in a city could perfectly well avoid the case by sending the patient to the hospital or sending for a surgeon. In the country, where a man is more on his own resources and develops more in the operations than a man does in the city, he has got to face the music; and if he has a gangrenous bowel, he must excise it if he can do it. The general practitioner in the country is especially skilful, it has always seemed to me, in the treatment of fractures. He gets very good results. I do not know whether this paper goes into the general treatment of hernia. Certain cardinal points about the treatment of hernia are almost self-evident to one who has had experience. We get cases in the hospital after some one has squeezed them so that they are gangrenous both by delay and contusion. Indeed, I have seen a hospital surgeon squeeze a hernia with great force, and he has asked me to put my hands outside of his and squeeze; but the result was fatal. You have got to have a general practitioner, a good one and of some intelligence, to treat these cases; and if in the country he must meet all the emergencies, if in the city he can avoid them. I have no doubt the subject has been well described and the emergencies dealt with by Dr. Gerster, and I will not go into the general treatment of strangulated hernia. One of the most remarkable cases I know of strangulated umbilical hernia was one where Dr. Richardson removed some nine inches of the bowel, sewed the ends together, and the woman I think had a movement of the bowel within ten hours. You cannot expect every general practitioner to make an excision of the bowel with the skill of Dr. Richardson or of Dr. Gerster; but he must be prepared to meet emergencies, and particularly to recognize the fact that he must not lose time by taxis, particularly forcible taxis, at the risk of doing a great deal of harm.

Dr. A. T. Cabot, of Boston: I was unfortunate in not hearing the first part of Dr. Gerster's paper in regard to taxis, and very probably he made a point I should wish to make — that one can be much more free with taxis in the very

commencement of a hernia, when it is new, than later. In fact, I should almost say it was best to forego taxis altogether in a distinctly strangulated hernia, that had been down more than four or five days, in order to avoid the possibility of rupturing the very much weakened gut by the taxis. I had a case that illustrates how easily one of these guts can be ruptured. It was in a patient who came to the hospital with a hernia that was quite reducible, but with difficulty. He had had it a great many years and was in the habit of reducing it. This time it had been down a little longer and went back hard. Just afterward he was seized with violent pain, and brought to the hospital twenty-four hours later. I did immediate laparotomy, but the patient was almost moribund when we began, and lived only a few hours. The condition was a minute rupture the patient had made on his own gut in reducing it.

I was very much interested in what Dr. Gerster pointed out as a necessity for great caution in opening up the neck of the sac in cases which have been strangulated some little time, in which there is a strong possibility that the neck of the sac has been so nipped that there is a weakened line around the neck of the hernia where the gut is ready to give way. It is in those little herniæ, particularly at the femoral ring, where the danger is greatest. In large herniæ there is less danger of cutting at the constricting point than in the small herniæ. The gush of fæcal matter I have seen once or twice when the neck of the sac was divided. It is immediate and difficult to handle unless you have already a large enough opening to allow of the free escape of the fæces outward.

It seems to me his recommendation that in all these cases the division should be from without inward is very pertinent, and it is one I shall put in practice more than I have hitherto done. I had a case a fortnight ago. The result was unfortunate. The hernia had been strangulated eight days and the gut was gangrenous. In that case, I opened up the neck in the way he describes, making really a laparotomy, cutting down above the neck of the sac and incising through the neck rapidly and pulling the gut outside at once. I secured it out by drawing a strand of iodoform gauze through the mesentery to hold it back, and surrounded that iodoform gauze in the manner he describes, but the patient lived only

two days. She was an old woman and very much exhausted. I think the point he makes is a very good one, and I shall certainly be encouraged by his precept to follow it up more fully, coming down on the neck of the sac with the eyes upon it, so that if there is a little line of gangrene you can at once see it and treat it with consideration.

Dr. C. B. Porter, of Boston: I don't think it is customary for the chairman to make remarks upon the subject of the paper, but there are one or two things I should like to speak of. Dr. Gerster considers the question of the action of the general practitioner, and lays great stress upon the highly antiseptic condition to which the patient and the operator should be brought, and it seems to me if I can say just one word in regard to what a country practitioner did in a case I afterwards saw, it would help perhaps some one placed in the same unfortunate circumstances. A patient met with a railroad injury, which produced a compound and comminuted fracture of the patella. He was at a distance from a surgeon, but he was under the care of a good common-sense man, who understood details if he could not carry them out. He had no antiseptics by which he could render anything sterile, but he had boiled water and soap, and he rendered the parts thoroughly aseptic by scrubbing with boiled water and soap and scrubbing his own hands, and he laid open the knee-joint as for incision, put the flap back into place, and sent the patient to the hospital with the wound practically healed. He had none of the necessary things about him to do this operation, but he did it practically aseptically by getting his own hands clean, the field of operation clean, and operating under these circumstances. I certainly was impressed in connection with the paper with regard to the stress laid upon early operation and upon the use of slight taxis. I do not want to say anything further on that myself. It seems to me that there is where the general practitioner fails more often in dealing with this subject than in any other; in the first place, in not recognizing the fact that a strangulation which will not take care of itself must have assistance; therefore the sooner it has it the better. I think it has been very aptly compared by Dr. Beach to appendicitis and to extra-uterine pregnancy.

Dr. Gerster, of New York: I shall have very few things to add to what was said by myself and the gentlemen here who were kind enough to join in the discussion, and I see only one thing noted down that I believe is worth while bringing up once more, and that is the remark made by Dr. Odlin. He said, if I understood rightly, if he had done a herniotomy and the patient continued to vomit that he would not hesitate to do a second laparotomy. I believe that that is a suggestion worthy of attention, and a suggestion along the lines of which surgeons have already tried to walk; but let me tell you that they have not always been successful. I have seen a number of cases where the intestine was found to be in a normal condition, where it was reduced, where no complication arose during the course of the operation, where we expected immediate relief from the vomiting. It is a charming thing to see, in a man who was vomiting every two or three minutes, the moment the constricting band is divided, all these disagreeable and distressing symptoms cease. Now when we find that this is not the case, there is grave trouble present; and I am sorry to say it is very frequently a trouble which is not within the pale of a surgeon's help. It is very distressing after we have performed a good operation and made a favorable prognosis, which is the most disagreeable part of the whole thing, to see the patient go on vomiting as if no operation had been performed, and ultimately go from bad to worse and die; and it is worth our while to know why that is the case.

Do not let us misunderstand each other. I do not mean cases in which the surgeon performed the herniotomy correctly as far as the technique of the operation is concerned, where the strangulation was relieved, the bowel replaced, where the surgeon has infected the wound and caused a septic peritonitis. I mean something quite different, and to explain to you what I mean I shall illustrate by a case which, I am sorry to say, occurred to me only recently, and the memory of it is imbedded in my mind in deep letters. The hernia had been strangulated a long time, and there is the essential part, the longer the strangulation has existed the more probable this occurrence, and it illustrates the serious effects of long-continued strangulation — not only upon the strangulated gut, not only upon that part of the strangulated gut which is actually constricted, but upon the

entire intestinal tract and upon the entire system of the patient. You may find a case of that kind and the gut not gangrenous, the obstruction in the gut due (as was in this case) to the presence of a square piece of potato which was within that portion of the gut which had left the abdominal cavity and by its mechanical presence obstructed the flow of the intestinal contents. The walls of the gut were normal, slightly congested, but no signs of gangrene; and I believe gangrene would never have come in that case. The patient died, not from strangulation, but something else. The hernia was cut down upon, that hard body was found in the knuckle of gut, crushed between the fingers, put out of the way, and the moment it was done the gut slipped back so that I had to catch it in order to have a chance to examine it. I withdrew the gut without difficulty, showing there was no real strangulation. It was an obstruction by flexion caused by this foreign body. I mean by flexion that condition you observe in a rubber-tube which you bend. You see a knuckle forms and no amount of pressure will force liquid through that bent portion of the rubber-tube. Just as the rubber-tube is bent and occluded so the intestine is bent and occluded, and the symptoms are practically those of obstruction. The intestine was examined, found to be normal and reduced. I withdrew from the family giving a favorable prognosis; and I was very much set back when I came the next morning and heard that the patient had been continually vomiting fæcal matter as before the operation. The obstruction had lasted five days. I said to myself, in the presence of these facts, knowing that I had reduced the trouble within the hernia, there must be some cause of obstruction higher up than the hernia was situated. The hernia contained a part of the small intestine, what part I could not say then. Seeing the patient continually vomiting matter that was feculent, liquid material, I at once suggested that we open the abdominal cavity, expose that portion of the gut which was just above the inguinal region, if possible hunt up the knuckle that was contained in the hernia and then try to find the cause of this obstructive condition. This was agreed to, and the hernial aperture was reopened, incision extended, and I satisfied myself that there was no portion of the intestine that had again entered into the wound. No radical operation was performed, and the con-

tiguous portion of the intestine was easily found and exposed. I failed to find any signs of constriction; but I noticed that although there was no constriction present, that portion of the small intestine leading away from the knuckle that occupied the hernia was shrunken up and empty, whereas that portion leading to the knuckle from above was distended enormously, contained a large quantity of gas and liquid fæces. The walls of the intestine were very much thickened, œdematous, the mesentery was congested, intensely so, as was the entire intestine; and although I could not find any constriction, I saw how far the trouble extended down to the knuckle contained in the hernia. Now there were all the symptoms of obstruction of the intestine and no cause for it whatever. I enlarged my incision, and brought out more of the intestine; as far as I could follow, I found this identical state. I said: "I never have seen anything of this kind;" replaced the intestine; closed the wound; and fell back upon symptomatic treatment in the good old-fashioned way, which resulted in the good old-fashioned way — in the death of the patient.

Post-mortem, we found that in this case the only cause of the persistent vomiting of the patient and of his ultimate exhaustion and death was nothing but an intense congestion or rather a paralysis of the afferent or proximal portion of the small intestine due to the intense congestion which was started, and to the prolonged retention or stenosis of the contents of the gut. In addition there were reasons to assume that there was also sepsis present, not due to the herniotomy, but rather to exosmosis of the intestinal contents, that is passing through the congested and abnormal intestinal walls of infectious material into the peritoneal cavity. It has been established by experiment on animals, that when the intestine becomes congested and inflamed, not only paralysis of its muscular coat and enormous distention of the intestine and inability to propel its contents result, but that the infectious bacilli contained within the intestine, within the fæces, will find their way out through the intestinal walls into the peritoneal cavity and produce an intense peritonitis; and I believe that in this unfortunate case we had a counterpart of the experiment which has been performed repeatedly on the animal. I believe this man died in consequence, first, of paralysis of the afferent

or proximal portion of the small intestine, of exosmotic peritonitis, although we did not find sufficient reason to make the diagnosis of peritonitis as we used to make it ten or fifteen years ago, when we believed it could be diagnosticated only where the intestinal coils were agglutinated, etc. Nowadays we see patients die, after a laparotomy, with all the symptoms of peritonitis, and we find post-mortem a slight serous exudation, sometimes not even turbid, and a very moderate amount of hyperæmia of the peritoneum. Many of these cases have been in the early days of laparotomy classed under the name of shock, and wrongfully. Nowadays we know these cases are septic peritonitis.

Dr. Cabot: In regard to the treatment by the general practitioner where he has sent for the surgeon, I would say that it has occurred to me to be called several times to such cases, in which I should have been very thankful if the general practitioner had prepared the field of operation for the surgeon. I think it would have been a very great assistance; and if general practitioners who do not intend to operate and have sent for surgeons would always apply an antiseptic packing over the field of operation, anticipating the surgeon's arrival, I think it would help the result very much.

ARTICLE VI.

THE INFLUENCE OF COLLEGE LIFE ON HEALTH.

BY

GRACE A. PRESTON, M.D.
OF NORTHAMPTON.

CHARLES H. COOK, M.D.
OF NATICK.

EDWIN FARNHAM, M.D.
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ROBERT W. GREENLEAF, M.D.
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READ JUNE 13, 1893.

THE INFLUENCE OF COLLEGE LIFE ON THE HEALTH OF WOMEN.

BY GRACE A. PRESTON, M.D., OF NORTHAMPTON.

About twenty years ago, the baccalaureate degree was for the first time conferred upon women in the State of Massachusetts. Before that date, there were several academies or seminaries, so-called, which gave opportunity for study somewhat in advance of that afforded by the public high schools, but there were no colleges for women similar to those long before established for men. Now five such institutions bestow annually degrees in letters, arts and sciences. The number of candidates this year aggregates about three hundred and fifty.

These colleges have sprung up to supply an existing demand. The daughters of the commonwealth were earnestly looking for the chance to pursue systematically those attractive courses of study which their brothers had always held the exclusive right to enjoy. This desire for higher education was a natural result of nineteenth-century progress. The public schools had given to boys and girls alike an introduction to classical literature and to other branches of learning. They had aroused in youth of both sexes a love of study and an eagerness to go on further into the land of promise. Yet, aside from a purely selfish longing for mental pleasure, there was a stern economic necessity that was urging women as well as men into all possible paths for lucrative employment. Many of the so-called "surplus" women of the old Bay State have had every incentive to call them from a life of dependence and idle pastime, and

they have become useful and productive members of society. It is no longer the fashion to bring up girls to a season of waiting for a change of destiny, but they, like their brothers, may have the enjoyment of choosing a way and a work for themselves. They need something to do, for the sake of health and happiness. With many, it is a question also of daily bread for self, and perhaps for dear ones.

The plans for higher education were met at the outset, as it is well known, by considerable opposition from different sources, but were valiantly defended by friends of the movement. Objections social, economic, æsthetic and ethical were proposed as reason for disapproval. The plea that seemed strongest of all was the one based on assumed physiological grounds. It was voiced by many prominent members of the medical profession. Among the prophets of evil was one respected Fellow of this society who wrote in 1873 the oft-quoted words:[1] "A girl cannot take a course of college work and retain uninjured health and a future free from neuralgia, uterine disease, hysteria and nervousness, if she follows the same methods as boys."

A former orator of this society made the following expression of opinion[2]: "It may be that here and there a young woman will devote all her early years to thorough courses of study, as it is said, in every branch of knowledge, without injury to her health or constitution, but these are the exceptions." More recently we have read the dictum of an English writer[3]: "She cannot reach man's standard of education, or if she does, it is at expense of health."

The two chief physiological arguments had reference to nervous and sexual systems. It was justly maintained, in

[1] Sex in Education; E. H. Clarke, 1873.

[2] N. Allen, Journal of Psychological Medicine, Oct., 1870.

[3] A. Hughes Bennett, Popular Science Monthly, Feb., 1880.

the first place, that woman has a more sensitive nervous organization than man. It was inferred, therefore, that she could not bear the strain of severe and long-continued study. We may quote again from A. H. Bennett: "Woman has less nervous capacity and vigor, diminished power of control, and a greater readiness to break down under physical and mental strain." In a paper published not long ago this statement is made[1]: "A girl is driven by a tireless sort of energy, which is a compound of conscience, ambition and desire to please, plus a peculiar feminine obstinacy." These are some of the reasons given to explain the fact that nervous debility occurs more frequently in women than in men.

The second argument presented in opposion to the higher education was this: Woman is incapable of joining in the race because of her "oft-recurring infirmity." Her early-developed sexual system could easily be put out of order by over-work of brain or nerves. Undue growth of mind would very likely be accompanied by atrophy of the generative organs. The highly educated woman would probably be unfit for maternal duties. If a large amount of nervous force should be directed toward mental culture, there would be left only a modicum for the maintenance of that function for which woman was specially created, namely, the bearing of offspring. In the words of Herbert Spencer[2]: "Absolute or relative infertility is generally produced in women by mental labor carried to excess."

These are weighty arguments indeed, and if our young women are in danger of becoming nervous wrecks, incapable of a successful motherhood in after years on account college training, the State government would do well to revoke the charters of these institutions. If the college

[1] High Pressure Education, R. T. Edes, Boston Medical and Surgical Journal, March 9, 1890.

[2] Principles of Biology, II., p. 486.

is the enemy of the home, let its doors be closed and the students sent home to parlor or kitchen. We believe, however, that the prophecies of the opponents of the higher education have not come to pass, but that instead it is true that the average college graduate has rather better health than the average woman who has not taken a degree. Rarely has it happened that a woman has become a victim to over-zeal in study, to any serious extent. It seems to be a fact that physical culture is advancing step by step with mental culture, and that the woman's college is already becoming a power for the increase of health and happiness.

Statistics published in 1885 by the Association of Collegiate Alumnæ, and more recently by Girton College at Cambridge, England, and by similar institutions, indicate the truth of this claim. My own experience of six years in connection with one of the largest colleges for women enables me to speak confidently of the good health of the students. Let us take a brief look at some of the prominent features of life in a woman's college.

The methods of work are not essentially different from those of the colleges for men. The requirements for admission are the same, and the curriculum of studies precisely equivalent. It must be that about the same amount of work is done. The number of hours spent daily in brain labor varies much. The average time, as estimated by 170 students, is about eight hours.

13 students report six hours or less;
38 " " seven hours;
84 " " eight hours;
35 " " nine hours or more.

Every student is mistress of her own time, limited only by the appointments for college duties, or for the events of a well-regulated household. There is, however, one re-

stricting law that is enforced in the dormitories, so beneficent in its action that one rarely hears of any opposition to it — namely, that all lights shall be out at 10 P.M. It is probable, therefore, that most of the young women get eight hours or more of sleep at night.

As to physical exercise, the usual amount seems to be about an hour and a half daily. Some students take considerably more. Practice in the gymnasium for half an hour on four days of the week, during nearly five months of the year, is required of all freshmen and sophomores, except those excused by the physician. Members of the two upper classes are invited to work in the gymnasium, if they wish, and quite a number choose to do so. There seems to be very little tendency toward overwork of muscles, and indeed we are not inclined to encourage to great extent those kinds of physical exertion which demand large expenditure of nervous force. It rarely happens that a student suffers even temporarily from too much exercise. Far more often there is complaint of ailments which quickly disappear when the victim begins to spend more time outdoors or in the gymnasium.

Yet, with all the careful regulation of work and rest, food and exercise, college life does give some chance for fatigue of brain and exhaustion of nerves. There are many attractive courses of study to which a zealous student may apply herself more severely and continuously than her health will allow. There is the nervous strain of more or less frequent recitations and examinations, and the wear and tear of life in a busy community. It may be that this discipline forms a good preparation for the trials of the years to come. However, for the college girl, it is not a life of all work and no play. She contrives many amusements for herself. There are outdoor sports and drives, dramatic and other entertainments, concerts and good times of various kinds.

In studying the effect of college life on the health, we find it sometimes difficult to distinguish between the influence of those conditions which are peculiar to college life and the result of features that are more or less common to womanhood elsewhere at the collegiate age. That is to say, there is lacking a definite standard of comparison between women in college and outside. Therefore the facts that we shall give are chiefly detailed statements regarding the actual health of students, without much attempt at comparison with the health of other women. First, some statistics will be furnished relative to the physical characteristics of the young women who come to enter upon the work of the first year, that we may have some definite knowledge of the material that is offered for training. In the second place, some account will be given of the disorders prevalent during college life. Thirdly, the health of graduates will be briefly discussed. Fourthly, we shall report some observations on the condition of alumnæ ten years after graduation.

First of all, then, let us examine the status of students at entrance. The average age, as estimated from a class of 191 members, is 18 years 9 months. The average weight is 123.6 lbs., the height 5 feet 3.65 inches. Some of the girls experience a decided change of climate, the home residences being as follows:

Massachusetts,	44	per cent.
Other N. E. States,	15	"
Middle States,	21	"
Western States,	18	"
Southern States,	1	"
Elsewhere,	1	"

These girls began school work at various ages, averaging about 6½ years; 74 per cent. of them have attended public schools exclusively, 21 per cent. private schools exclusively, while 5 per cent. have spent more less time in both. The

total number of years given to public schools is seven times as great as the number passed in private schools. Most of the girls have had eleven years of school-room discipline before arrival at college, and yet they are, as a rule, in a satisfactory condition of health.

Health.	*Percentage.*
Excellent,	36
Good,	35
Fair,	24
Poor,	5

Those who claim to be in excellent or good health constitute about 71 per cent. of the class. The few, about 5 per cent., who are in poor condition owe it to one or more of the following causes:

1. General debility, of long standing, or due to some recent illness.

2. Inherited or acquired disease of some organ of the body.

3. Weariness of brain or nerves from severe study in preparation for the entrance examinations, or more rarely to other trial just preceding entrance.

Some of these, who are in poor health, we should like to exclude, and sometimes we do send them home soon after the beginning of work. The college can hardly afford to make of itself a sanitarium for the care of invalids. It is strange, too, that parents ever allow daughters to leave home when so much out of health. However, the number of such students is comparatively small.

About 23 per cent. of the class think that they have at some time experienced painful or disagreeable symptoms in consequence of over-application to books. Most of them say that the disturbance was slight and transient. 62 per cent. confess to having been more or less inclined to worry over school-work. 41 per cent. have had some

trouble with the eyes, or defect of vision. 5 per cent. are afflicted with deafness, usually in slight degree. As to the state of the menstrual function, we note the following facts. The average age at the first menses was 13 years 4.63 months. The present average duration is 4.9 days.

Conditions.	*No. of Students.*	*Percentage.*
Regular in time,	139	72.7
Free from prostration,	109	57.1
Slightly prostrated,	42	22
Free from pain,	57	29.8
Suffering slight or infrequent pain only,	78	40.8
Flow profuse,	11	5.7
Flow scanty,	23	12

To summarize, 79.1 per cent. have little or no prostration;
70.6 " " " pain.

Since the health of students is so good, on the whole, at entrance, we should not expect to see many breaking down unless college life really made great tax on the strength. Nor are we disappointed. A careful search of the records shows that, among 983 young women in the regular academic courses during the past four years, 27, or 2.75 per cent., have dropped out from physical disability. Dr. Hitchcock[1] of Amherst College reports 2.85 per cent. of failures from poor health, for a period of seventeen years.

Five of these students who did not complete the course were removed by death, not, as we believe, due to any peculiar effect of college life. The causes assigned were the following:

I. Pulmonary tuberculosis.

II. Suicide, not easily explained, but not in any person's opinion due to the mental or nervous strain of college work.

[1] Report of Massachusetts Board of Health, 1879, X. 63.

III. Typhoid fever.

IV. Acute general peritonitis.

V. Diabetes mellitus.

The causes for interruption of studies in the case of the remaining 22 students referred to were these:

Disease.	*No. of Students.*
Nervous debility,	5
Nervous headaches,	3
General debility,	5
Poor eyes,	3
Deafness,	1
Typhoid fever,	1
Uterine troubles,	2
Peritonitis,	1
Spinal curvature,	1

It will be noticed that only eight of these were suffering from nervous disorder. Three of them had been in college less than one term, and were in poor health at entrance. In two other cases the trouble had existed previous to the beginning of college work, and did not show any great aggravation. The three cases remaining are examples of the effect of too much brain work, coupled with neglect of some of the essentials of a hygienic life. The results were not very serious, and recovery is already perfect, or assured for the future.

In addition to those who have dropped out permanently from the course, 16 have been obliged to give up for one term or more on account of some disorder or disease, have improved or recovered, and re-entered college or will do so the coming fall. The causes for temperorary interruption are similar to those assigned for final withdrawal. Only two were instances of nervous debility brought on by overwork, and in one of these worry over outside matters had a great deal to do with the break-down.

To speak now more fully regarding the maladies which may be seen among the students, we may say, first, that the complaints vary with the time of year or the relative part of the term. The common ailments prevail here as in every community, the comparative frequency depending doubtless on the peculiar conditions of college life. Looking back over some months, we have made a classification of one thousand cases, the last in series:

Disorder.	*No. of cases.*	*Percentage.*
Catarrhal,	308	30.8
Digestive,	170	17
Menstrual,	112	11.2
Nervous,	86	8.6
General debility,	56	5.6
Skin,	61	6.1
Eyes,	56	5.6
Ears,	27	2.7
Minor surgery,	50	5
Infectious,	15	1.5
Rheumatic,	26	2.6
Other cases,	23	2.3

It is to be observed that nearly one-third of the cases were catarrhal in nature, apparently due to "taking cold." The frequent atmospheric changes that characterize our climate, and the severity of our winter, are usually held to be largely responsible, but there are other causes which are of considerable importance. In the first place, some of the students allow their rooms to become over-heated by day, over-ventilated by night. Again, a certain number spend too little time outdoors during the winter months, although the majority probably take rather more outdoor exercise, on the whole, than most other women.

Another fact is that many wear insufficient clothing for the severe weather. A pity it is that woman's dress is often

ill-adapted to the climate. In many instances, the extremities are not warmly clad, and the consequence is to be noted in the repeated complaints of coryza and pharyngitis. However, in our opinion, a larger proportion of college women dress sensibly than of women in other walks of life. Certainly the enlightenment of the intellect ought to make a person able to judge more correctly with regard to so practical a question as this.

Next to catarrhal disorders in frequency are disturbances of the alimentary canal, constituting 17 per cent. of all cases. This includes headaches and other reflex troubles dependent on some defect in the process of digestion. Usually these complaints are transitory in character, provoked by some error of diet, or by neglect of exercise. The "box from home" with its stock of rich goodies has not yet become a thing of the past, and is occasionally productive of mischief. Or it may be that too frequent indulgence in Huyler's Ice Cream Soda is the cause of trouble. However, it must be said that the appetite and digestion of college girls are about perfect. Meals at regular hours, wholesome food, abundance of interesting work, exercise indoors and out—these are influences favorable to digestion. Dyspepsia is not a product of college life.

The third class of complaints we have grouped under the term "menstrual." It embraces all the disorders of the generative organs which have come under observation. Enumerating the cases, we find that about 34 per cent. are amenorrhœa, 27 per cent. dysmenorrhœa, 9 per cent. too frequent or profuse menstruation, and the remaining 30 per cent. distributed over sundry troubles referred to pelvic organs. Amenorrhœa is most common in the autumn, particularly among students of the first year. There are every fall several cases in which the menses do not appear for some months. Usually the disturbance occurs in young women who have experienced a decided change of climate,

or to whom college life is decidedly different from the life at home. The patients are in excellent health otherwise, gaining weight as a rule. No active interference is considered necessary, and after a variable time, nature resumes the periodical performance of the function, sometimes with greater regularity than ever before. It seems to be a fact that college life, particularly in case of the hard-working student, is more apt to bring about a less frequent and less profuse menstruation than the opposite effect, if it disturbs at all. In some instances this constitutes an improvement over previously-existing conditions. Too sedentary a habit, with consequent debility or over-exertion at the time of the period, are oftenest responsible for increase in frequency and amount of the flow. In nearly all the cases of dysmenorhœa the pain is both uterine and sacral, and a small proportion have reflex headache or disturbance of the stomach. There is a slight tendency toward increase of pain in those who find some nervous strain in the conditions of college life.

To return to our list of maladies, we notice that nervous derangements constitute 8.6 per cent. of all cases observed. Some of them were due to overwork or worry acting upon a subject predisposed by heredity or by experiences that ante-dated college life. The larger number are examples of slight disorder arising from temporary conditions. Really serious illness from mental or nervous strain is very rare, as we have already seen. Most of the sufferers get well very promptly when they spare time for a proper amount of exercise, rest and sleep.

The symptoms oftenest complained of are one or more of the following: Pain and other bad feelings in the head, back-ache, neuralgia, nervousness and disturbances of sleep. If they are looked upon as warnings that brain or nerves have been over-taxed, or perhaps not sufficiently nourished, and if the error is corrected, relief soon follows. The complex of symptoms known as neurasthenia is almost

never to be seen in students. Sometimes it happens that a person so afflicted insists on attempting the course of study, but we usually send her away as soon as the true state of her health is known.

Although many women improve in health while in college, we are unwilling to admit those who are invalids at the outset. A young woman who is in poor condition at entrance may be determined to struggle on through the work, against all advice. For example, Miss D., who had inherited a nervous constitution and a frail body, came in a state of nervous exhaustion from hard work in preparation. It was found that she had a marked degree of spinal irritation, suffering from frequent and severe pain in the back. She was urged to give up work, but persisted in it, and finally reached graduation, still in poor health, but in some respects better than at entrance. She was a subject of occasional brief attacks of a sort of aphasia, in which she could not recollect even her own name. More than once on entering a room where several of her friends were sitting, she withdrew hastily because unable for the moment to remember who they were.

The following cases are the most marked examples of nervous derangement which have come to notice during four years:

Miss E. had worked very hard all the year preceding, and particularly in the summer months, just previous to the examinations, having only recently decided to enter college. She was admitted with heavy conditions which she determined to clear off as soon as possible. Boarding in town, she thought herself freed from any obligation to retire at 10 P.M., and so continued her daily study till about midnight, and then went to sleep with the intention of waking herself early so as to work an hour or two before breakfast. The result was inevitable — she came soon to complain of pain and a sense of constriction in the head, and owned that

she felt nervous and tired. Wisely taking the advice offered, she went home to have a year of comparative leisure. The following autumn she re-entered in a fair state of health, improved steadily, and was in excellent condition during the Junior and Senior years. It seems very strange that parents or guardians can ever allow a young girl to do double work, especially in the warm summer, in her haste to enter college. If she comes tired out nervously, she will probably fail in some part of the examinations. The prospect for her then is a poor one. In reality she ought to have a vacation from books, but instead she must devote all the time that can be spared from college studies to making up the preparatory work in which she has been found deficient. In a case of this sort, the risk to health may be very great.

Miss F. is an example. She struggled along for months, giving up her leisure to entrance conditions. She was urged to take her time about it, but she was anxious to get rid of the burden as soon as possible. Not long after the pressure was off, she came to make confession of a strange state of mind. There is an overpowering desire to systematize, to put in order everything with which she has to do. In her room every article has its own exact place where it must stand, or else she is in distress. If a friend enters and unwittingly moves some object slightly out of position, she has an intense feeling of discomfort until she is able to replace it. Of course, it is "very silly" to be so particular about trifles, but she cannot be indifferent. If she writes a letter, she prefers to do it in the presence of some friend, because then she can have courage to seal it at once. If alone while writing she cannot refrain from looking over the letter again and again, to make sure that expression, punctuation, etc., are all just right. She is dissatisfied, tears it up and writes another which proves to be just as inaccurate. Every evening it is her habit to arrange a programme for the next

day, and great will be her misery if it cannot be carried out to the letter. It seems to be a necessity with her to make at bed-time a review of the day that is past, recalling even the most trivial circumstances. She tries to recollect every word that she has spoken and every word that she has heard. Formerly she did it occasionally as an exercise of memory, but now it is an irresistible habit. Another annoyance is the strong inclination to the making of lists of every sort; for example, books that she has read, books that she intends to read, letters that are to be written, and calls that are to be made. Many times a day she finds herself with paper and pencil in hand, busy with contriving some list. She has ever so many of them saved for reference. She knows that it is all folly, but can't help it. These strange habits have stronger control just after she has been in recitations or in the company of friends. She always assumes a cheerful manner, although she is often troubled in mind. Generally she sleeps pretty well, but is sometimes wakeful, and then is obliged to go through some painful routine. Ordinary study of lessons does not satisfy her. A translation, for example, must be looked over many times; at one time for a consideration of nouns, again for the verbs, etc., etc. Even then the lesson cannot be perfectly learned, and she is very apt to make a poor recitation.

This young woman was advised to give up at once. Improvement began very soon, and continued till good health was regained. She married two or three years later.

Miss G. was an example of nervous debility, due chiefly to causes outside of college studies. Naturally nervous, she became more so after the death of some friends, and unfortunately she became intimate with a young woman quite as nervous and morbid as herself. Her symptoms were headache, pain and pressure in the cervical region of the spine, and occasional disagreeable sensations and twitchings in the right arm. She suffered somewhat from

indigestion, and was a lithæmic subject. All study was intermitted for a year, and there was great improvement in health.

Miss H. was a student who lived in her own home, under parental oversight. She had a delicate physique and a nervous temperament, with an inclination to worry over trifles. Any unsual excitement or exertion would bring on temporary nervous exhaustion. Nevertheless, she worked eight or nine hours a day throughout the course. Formerly she often had strange fears. For example, in going up stairs it seemed necessary always to count the steps, and if by chance the last one had an odd number she would be much distressed, thinking that something terrible would happen if she did not go back and manage to end with an even number. When away from home she was always alarmed at the ringing of a door-bell or a knock at the door, fearing that a messenger had come to bring ill-tidings from her family. At graduation she was in better health than at entrance, in spite of continued hard study.

Such cases as these that have been described are very rare.

Insomnia is a rare complaint, usually very transitory. It is more apt to occur in those who exercise little, and who spend the evening in hard study on some difficult subject. The science of mathematics is particularly apt to carry its problems into midnight hours, in case of brains that do not easily get the mastery over it.

Contrary to the prophecy of twenty years ago, college education has been proven to have a restraining influence upon the emotions, and to check rather than favor the development of hysteria. Training of intellect is accompanied by discipline of feelings and increase of will power. College life partly by means of brain work and nervous strain, has been the very means, in some instances, for transforming a weak and sentimental girl into a woman of earnest

thought and action. Hysteria, even in its mildest manifestations, is almost unknown in college history. The atmosphere is hostile to it, and chokes it out in its incipiency.

Going back again to our list of disorders, we remark that 5.6 per cent. are cases of general debility. The patient complains of lack of strength, inability to work or exercise without undue fatigue. There is more or less anæmia, and a general lack of vigor. The condition may be of long standing or due to recent causes. Some of these young women of delicate constitution have great power of mental work, and with care of themselves succeed well in carrying on the course to its completion.

The cases embraced by the term "minor surgery" were chiefly the slight casualties that may happen to people anywhere. Sprains of joints and muscles have been the most common accidents. Mishaps in the gymnasium have been very few and by no means serious.

Infectious disease has rarely found any victims among us, except indeed the epidemic influenza, which did not pass by even healthy, vigorous young people. However, it did not trouble us much. Some of the cases showed scarcely any catarrhal symptoms, but only the high fever, the general pains, the severe headache and backache, all of which were nearly or quite gone on the second day. Recovery was usually prompt and complete.

In the course of four years typhoid fever has appeared six times in young women who were doing college work. Three showed themselves very soon after the opening of a fall term, one in mid-winter and two in the course of a spring term. These last two arose in houses in town, at some distance from each other, and the origin could not be ascertained. These were severe in type, one proving fatal in the third week. Three other cases have occurred toward the end of the long summer vacation in students who had ex-

pected to return. All recovered, and two of them re-entered college.

During the same period of time there have been four cases of scarlet fever, one only suffering severely. In every instance prompt isolation prevented spread of contagion. We have avoided epidemics of other contagious diseases by strict quarantine of the individual cases that have appeared.

Having now made a detailed statement of all the disorders that have been seen among the students, including even those disturbances of health which are in large measure accidental and not dependent on college life, we will proceed to give some statistics, obtained from a class of graduates, relative to present health and the changes that have taken place during the four years of their course of study. These data were furnished by one hundred students, nearly the entire number in the class, and the percentages will be very nearly correct for the whole class, judging from our personal knowledge of the members who have not given the items of information.

At completion of the course 80 per cent. are in good or excellent health, whereas only 66 per cent. were in good or excellent health at entrance.

	Excellent.	*Good.*	*Fair.*	*Poor.*
Health at graduation, - -	35	45	18	2
Health at entrance, - -	28	38	27	7

Thirty-five per cent. claim to have health better than at entrance. The improvement has been as follows:

	Percentage.
From good to excellent, - - -	10
" fair to good, - - - - -	17
" " to excellent, - - -	1
" poor to fair, - - - - -	5
" " to good, - - - -	2

Inquiry as to the cause responsible for the change elicits various answers. Many of the students believe that the

good effects of college life are largely due to the regularity of hours for the events of the day, for work and exercise, eating and sleeping. Some claim benefit from the change of climate. Several speak of the influence of interesting and satisfactory employment. Congenial companionship is also mentioned, and the freedom from the petty cares and worriments of the home where they had formerly shared the burdens. Some of these young women realize that they have recently learned how to take better care of the health, and are now able to keep well. The gymnasium has benefited a large number.

Nine graduates think that their condition is less good than at entrance, although two of them report that they are still in good health, and six claim fair health. Three cannot suggest a reason for the decline, and six explain it in various ways, as due to excess of laboratory work, over-exercise, lack of exercise, stomach trouble, unsatisfactory diet or nervous strain. One student only thinks that her health has been injured by the nervous strain, and none allow that they are now suffering from the result of over-work of brain.

However, 35 per cent. of the class confess that they have at some time during the course felt some unpleasant symptoms from over-application to books, particularly just after an examination season. Nearly all remark that the disturbance was slight and not at all lasting. 74 per cent. had no headache during senior year from any cause whatever. 91 per cent. had, during that time, no other disagreeable feelings in the head, such as often come from over-work. 86 per cent. were not afflicted with nervousness, and 89 per cent. always slept well.

The number who have imperfect or troublesome eyes constitutes 41 per cent. of the class, the same percentage that we found in the large class of freshmen considered earlier in this paper. Another class who had worked nearly three years in college reported about 40 per cent. of eye troubles.

Defective eyes doubtless declare themselves, as a rule, previous to the time of entrance into college, even if the nature of the weakness is not yet exactly known, and the proportion of students so affected does not increase during the college course. In case of the graduates to whom reference has been made, 16 per cent. had some form of astigmatism, 14 per cent. were near-sighted, and 8 per cent. far-sighted.

Questions regarding the menstrual function in case of these same graduates established the following facts:

Condition.	*Percentage.*
Regular in time,	79
Not at all prostrated,	53
Slightly prostrated,	30
Free from uterine pain,	64
" " backache,	63
" " uterine pain and backache,	53
" " headache,	86
" " all pain,	49
Flow profuse or excessive,	6
" scanty,	11

Average duration, 4.8 days.

Of this number of students 24 per cent. had experienced some permanent improvement in the menstrual conditions since entrance into college, and 18 per cent. had found deterioration in one or more respects:

Improvement.	*Percentage.*
More regular,	17
Less pain,	8
Less profuse flow,	5

Deterioration.	*Percentage.*
Less regular,	6
More pain,	11
More prostration,	3

It would obviously be unfair to attribute every instance of improvement or deterioration to influences peculiar to college life. Yet we believe that these statistics do indicate at least that most women are not unfavorably affected in regard to this function of the body by the higher education of the brain. The number of those who improve is greater than the number who suffer deterioration.

If we compare these figures with the percentages obtained from students at entrance, our statement finds confirmation. A larger number of graduates are regular in time, fewer are prostrated, and more are free from pain.

Comparing our statistics with those given by Dr. Mary Putnam Jacobi[1] relative to 268 women taken from various walks of life, married and single, we see a decided difference in favor of college women. By her investigations it was found that 35 per cent. were free from menstrual pain. In our list 53 per cent. were entirely free from uterine or sacral pain, and 83 per cent. had little or no prostration.

It must be true that a large proportion of the students are not incapacitated for work, even for the first day of the period. However, it is possible for them to absent themselves from classes for a day or two without serious consequences. They are advised to refrain from taking a large amount of physical exercise, and are told not to practise in the gymnasium. There seems to be no reason for interdicting a moderate degree of mental effort, if we judge from our own observations. Dr. Jacobi[2] says: "There is nothing in the nature of menstruation to imply the necessity or even the desirability of rest for women whose nutrition is really normal." Another[3] writes correctly: "Much has been said against severe study during menstruation, but no one should

[1] The Question of Rest for Women, New York, 1877.

[2] Op. cit., p. 227.

[3] A. J. C. Skene, Education and Culture as Correlated to Health and Diseases of Women, Brooklyn.

be required at any time to pursue a course of study which cannot be kept up during menstruation."

It will be granted, from the report just given, that the graduate has a good opinion of her own health. Is it possible that she is in some degree self-deceived? It has been suggested that sometimes a real weakness exists which does not show itself while the victim is in a state of nervous excitement, and that by and by, when no longer subject to powerful nervous stimulation, she may collapse completely and become a wreck.

Doubtless there have been some instances of such a breakdown — they are more apt to occur in women because of their great power of endurance under nervous strain. We are not able to give full statistics to indicate the relative number of such cases. We have investigated the record of one class who took the baccalaureate degree over ten years ago, and have obtained the following information:

There were thirty-seven at graduation, and two have died, one from typhoid fever, the other from some operation on the pelvic organs. Of the thirty-five still living, three only are in poor health. One has never been in any better condition than now, but she worked hard in college and felt no greater injury than a slight disinclination to mental effort for a year or two after. The second was among those whose health improved in college in a marked degree. Some time after, she met with a painful accident, followed by years of invalidism, from which she is now recovering. The third was well for some years after graduation, but became insane by force of strong heredity.

Excluding these who have been mentioned, there are thirty-two of the original thirty-seven who are enjoying life in various occupations, as useful members of society.

Teachers,	14
Married,	8
At home,	4

Physicians,	3
Musician,	1
Librarian,	1
Secretary,	1

None of these felt any ill effects of college life that were not already apparent at the time of graduation. Four were then in poor health, which they explain in various ways. One had just had a severe attack of measles, and thinks also that she had not taken good care of herself as to exercise and diet. Another had passed through a distressing affliction. A third had suffered from climatic influences, being naturally delicate. During the college course she had spent summer vacations in a warm and malarious region, and so felt over-taxed by the New England weather. The fourth was a victim of youthful errors that were in no way necessary or common accompaniments of college life. Lack of hygiene as to diet and exercise, and certain emotional causes brought about a condition of ill-health that lasted for years, although she has finally made a good recovery. In this same class there were seven who were in much better condition at graduation than at entrance. One of them remarks enthusiastically that college work was to her far less fatiguing than the employment of the years since, namely, teaching.

It is evident from these statistics, as from others that have been published, that a comparatively small percentage of college women marry, probably only about one-fourth of the whole number. Various explanations have been suggested, but with these we shall not concern ourselves. In the class under consideration, the eight members who are married are all mothers and are in good health. Twenty children have been born, of whom three have died. The seventeen still living are in excellent health, except two, who are described as nervous and of rather delicate constitution. In most

cases the mother has succeeded well in nursing her children.

The future of our colleges for women will doubtless show a record even better than that of the past. Increasing facilities for physical culture and a growing interest in athletic exercises will serve as safe-guards against overstrain of brain or nerves. The college atmosphere seems more and more to favor health. The knowledge and practice of hygiene are becoming essential parts of the higher education. The time may sometime come when the graduates will be distinguished not only for mental culture, but for their surprising physical vigor and strength.

THE EFFECT OF COLLEGE LIFE AT WELLESLEY.

BY C. H. COOK, M.D., OF NATICK.

"It should be confessed," says Albert Shaw in the Review of Reviews for December, 1892, "that the women's colleges themselves (including the institutions which admit young women on the co-educational plan) deserved to suffer more keenly than ever fell to their lot for giving any justification whatsoever to those who held that the most advanced and most protracted courses of study might not be pursued as healthfully by young women as by young men."

This is a serious confession. Is it true of Wellesley?

Fifteen years ago the effect of college life at Wellesley was a theory. To-day a condition, and not a theory, confronts us.

Wellesley, in common with other colleges, is often held responsible for the results of sins committed prior to entering college. I will give only one instance out of many taken from my record book.

Miss M. S—— entered college at sixteen years of age. Family history as follows:—mother, aged forty-five, "decidedly nervous," one sister, aged twenty-four, "fearfully nervous," another sister, aged twenty-two, had "spinal trouble" which I suspect was a case of irritable spine. Personal history as given:—had diphtheria at ten years of age, scarlet fever at thirteen and typhoid fever at fourteen. From fourteen to sixteen years of age studied eight or nine hours daily, retiring at ten or eleven o'clock. Piano practice two hours daily from eight to fourteen years of age. Harp practice two hours daily from fourteen to sixteen.

Walked about four miles daily to school, climbing a "fearful hill." Studied "harder than ever" during the summer previous to entering college. She broke down and went home at Christmas; returned to College the next September, and consulted me the last of October. Is it any wonder that she dreamed of the "end of the world" and the "millenium"?

A physician's certificate of good health is required of every one admitted at Wellesley, but I regret to say that, in too many instances, it is not reliable.

I had personal knowledge of the following case: A young lady from another state was told in the spring by her family physician that she was not well enough to enter college in the autumn. She had no medical treatment whatever during the summer, asked for and received a certificate of good health from the physician already referred to, entered college in September, was obliged to leave because of her health before the end of October. A year later she entered Smith College, where she was graduated two years ago, and has been able to do nothing since. There are two students now at Wellesley who asked to be excused from certain requirements because of physical disability. One of them entered college on a certificate of "no organic trouble whatever," given by her family physician, who was ignorant of the fact that she was wearing a pessary introduced by a physician consulted while she was in the preparatory school; the other on a certificate given, as she stated, "by a doctor who did not know me."

After making all due allowances, what are the effects of the Wellesley life on health?

In the earlier years of the College no systematic health records were kept, and we therefore have no data from that source. The same is true, in large measure, in regard to the after effects of college life as shown in the histories of the alumnæ. Perhaps the best idea can be gained from the

changes in college life, courses of study, and amount of time given to physical culture. I am informed by one of the senior professors in length of service that these changes were made "in the interests of health." They are therefore a confession that the college life was having a more or less injurious effect on health.

The changes in college life are, in brief:—The evolution of the *individual* from the *general*, of the *small building* from the *large*, of the *small number* from the *crowd*.

Marked changes have been made in the courses of study. Three periods, of forty-five minutes each, have been dropped from the sophomore year in order to relieve both the sophomores and the freshmen. Junior year, formerly an overcrowded year, is now more largely elective—the result of a discussion which has changed the whole curriculum, giving more elasticity to the course. All students are required to take a course in physiology with dissections. On the whole, the number of subjects before the mind at any given period has been reduced. Admission by certificate was introduced as a purely health measure, to relieve unnecessary strain.

Physical culture is now a department, an evolution from a gymnasium for three hundred and fifty, fitted up at first with the American system, next the Sargent, and now chiefly the Swedish, introduced in the autumn of 1891. All the freshmen, unless excused, are required to take three hours of gymnastic training weekly, in the daytime. Every student undergoes a thorough physical examination. The sophomores have body training, I think by the DelSarte method.

A Board of Health has been organized, consisting of the president of the College, the two resident physicians, the director of the gymnasium, the physical examiner, and the professor of elocution. Among other duties they are to see that there is no overcrowding in any department, and no

overwork resulting from extra requirements in different departments at the same time. If I am not mistaken, no degree will be given to a student unless she has taken at least one year in physical training. It is the aim of the board of health to admit no student at Wellesley unless she can take the physical training.

College societies were first introduced, then suppressed, afterward revived, chiefly as health measures. No girl can belong to more than one society, neither can she belong to any society while carrying extra work, such as conditions in her studies.

In regard to the menses as an indication of health, the physical examiner states that possibly 40% of the students are affected in that respect while in college; that about 25% are irregular—oftener delayed than otherwise.

I take the following data from the records of forty freshmen taken at random, who exercised in the gymnasium forty-five minutes, three times a week, from November to May—six months—1891–92.

	Mean increase.	*Extreme increase.*
Girth of chest,	1 inch+.	2 inches+.
Depth " "	1 "	1½ "
Strength of chest,	17 lbs.	35 lbs.
Capacity of lungs,	25 cub. inches.	35 to 40 cu. in.
Breadth of shoulders,	¾ inch.	—— ——
Strength of back,	20 lbs.	80 to 90 lbs.

Very full and interesting statistical tables of the class of 1891, collated by the physical examiner, Miss M. Anna Wood, have been published, and from them I make the following extracts:—

Number graduated June, 1891, 104. Health at entrance: "excellent" 15, "good" 56, making 71 who entered college under favorable physical conditions. Of these, 46 were away from college at no time because of sickness, 7

were away 1 week, 9 were away 2 weeks, and 9 were away 3 weeks. Not a very bad record for those who entered college under proper physical conditions.

As regards daily out-of-door exercise, the record is not favorable, as will be seen from the following:

	Less than 1 hour.	*1 hour.*	*2 hours.*
Before entering,	8	29	29
After "	49	45	2

Before entering, 20 took more than 2 hours, 5 taking 4 hours—while after entering *none* took over 2 hours.

I notice the following fact, not very complimentary to our profession. Six members of the class were daughters of physicians, of whom two were in "good" health at entrance and four were in "indifferent" health.

One of the resident physicians informs me that many delicate girls at entrance graduate stronger in health.

Wellesley is not a sinner above all other colleges and desperately wicked in regard to her respect for the laws of health. She, with them, has not practically recognized the fact that "The first requisite to success in life is to be a good animal," but the truth of the quotation is becoming more and more evident to her.

I have spoken of the changes in the courses of study and elsewhere as a "confession," but are they not also a ground of encouragement, and prophetic of coming days at Wellesley, when the laws relating to physical life and development will be as sacredly respected and observed as those of the moral and intellectual life? And "the question whether or not a young woman's health is quite safe at College will be absurd upon its face, * * * because one of the definitions of a woman's college will be: A place where the health of young women is sedulously and scientifically guarded, and where her physical strength and well-being are systematically developed."

SOME CONDITIONS AFFECTING THE HEALTH OF STUDENTS.

BY EDWIN FARNHAM, M.D., OF CAMBRIDGE.

THE influences that have a bearing on health are many, and there is a negative as well as a positive aspect of the subject, the preservation of health depending fully as much upon leaving certain things undone as it does upon doing others.

What applies to mankind in general also applies to the undergraduates of our universities and larger colleges.

The majority of students at these institutions are between seventeen and twenty-five years of age. They are, or should be, situated under as favorable sanitary conditions as mankind at large. They have passed the age at which certain diseases are most prevalent. They are approaching the age at which phthisis is beginning to reap its harvest. They have not yet reached the age when the diseases of degeneration are active as causes of death. The mortality among them should, therefore, be low.

As a matter of fact among mankind at large the mortality between the ages of seventeen and twenty-five has risen but slightly above its lowest point. It is manifestly impossible to consider at present more than a few of the conditions which affect health. Let us then consider briefly those conditions affecting students which should be amenable to control to a greater or less degree. From what one hears and reads it is difficult to avoid the belief that there is an opinion abroad in some quarters, that a large part of the time of the undergraduates at our educational institutions is passed in training for athletic contests or in a round of dissipation; and

possibly some ignorant persons may really think that this is a correct representation of college life. Now I feel sure that any unbiased investigator who will look into this subject carefully will be led to the conclusion that the morals of undergraduates, as a class, compare favorably with those existing among an equal number of men of the same age and social position taken at random from the community at large. At any rate that is the opinion at which I have arrived. Regarding athletes they are, as compared with the whole number of students, but few, and always must be so; for the true athlete, like every real artist, is born, not made. Much has been written about training, as if by some mysterious process an athlete could be developed out of any sort of material. As I understand training it is a process by which a man is put into a condition which enables him to make the greatest skilled muscular effort of which he is capable in a certain way, for a certain time. It may be beneficial to health, but that is not its object. You must have the proper material to work on, or all the training in the world will be of no avail.

At many colleges large sums of money have been spent on the various preparations necessary for athletic contests, and a great deal of time and labor devoted to them. At some colleges special privileges have been granted to the men composing the athletic teams.

Has an equal amount of attention been given to the care of the health of the students, considered in the light of a subject in no way connected with muscular development? What I know about this matter relates mainly to Harvard University, but I am disposed to think that other colleges would not be found to be superior to her in this respect. I am, and for more than thirty years have been, interested in athletic sports, but I hold it true that the first duty of a great educational institution is to the scholar:—not to his intellectual needs alone, but to everything that makes for the

preservation and improvement of health as well. None can know better than the body of physicians here assembled that the use which a man may be able to make in his life work of the knowledge acquired during his school and college days will depend largely on the condition of his health. Physical exercise has been a mania for some time, and much nonsense has been written about it. Even so great an authority as Dr. Parkes says, in his Practical Hygiene, "Exercise is a paramount condition of health, and the healthiest persons are those who have most of it." Exercise in the proper amount is indeed one of the means conducive to the preservation and improvement of health, but there are others as important, and some more so. The scholar should always bear in mind that in his case exercise is intended as a means to health which shall enable him to do his proper work in the best manner. He should never try to combine great mental with great bodily labor. I feel sure from personal experience and from what prominent athletes have told me, that it cannot be done with safety. Clement Dukes, speaking from his large experience, says: "Severe brain work precludes much bodily labor; and severe bodily labor prevents great mental work; both cannot be borne together, it is intemperate to try; but the best amount of work is done with a reasonable proportion of each."

One reason for this incompatibility is probably due to the fact that complicated muscular movements and those exercises to which close attention must be given necessitate in reality severe mental work, and therefore do not afford the relaxation needed by a tired brain. To say that both have been done in some cases with impunity is only saying that exceptional persons exist, which no one will deny. It is customary for the student who seeks health to take a part at least of his exercise in a gymnasium. As the respiratory needs, and the amount of effete material given off during exercise are increased, it is very important that the ventila-

tion of the building in which exercise is taken should be as perfect as possible, a subject which has, I fear, received but little attention in some gymnasia.

De Chaumont's test of the impurity of air contaminated by animal emanations, that derived from sense of smell, can be strikingly exemplified by any one who will pass from a pure atmosphere out of doors into some gymnasia when a large number of persons are exercising therein.

There has existed for some time at Harvard University an antipathy, among many of those taking part in athletic sports and exercising in the gymnasium, to have the exercising clothes washed, it being considered preferable that they should be worn until too rotten for further use. There are in the Heminway gymnasium some fifteen hundred lockers for the reception of the clothing used during exercise, situated in the basement and upon the first floor. Such ventilation as there is from these lockers is immediately into the building, and considering the condition of their contents cannot but increase the impurity of the air supplied for respiration.

At a certain period of the world's history we know that sanctity and somatic filth were in some cases closely linked together, but now-a-days we are rather disposed to consider them as mutually exclusive, as health and filth certainly are. "Evil communications," we read, "corrupt." I have been told that in the new gymnasium at a sister University this insanitary arrangement of the lockers has been imitated.

"Of all conditions that are prejudicial to the healthfulness of the dwelling, air that has been rendered impure is the most productive of evil." One of the many causes which renders the air of dwellings impure is the presence of man exhausting the oxygen by respiration, and adding to the air various animal emanations.

It has been computed that 3000 cubic feet of air must be

supplied hourly to each man to enable him to obtain the necessary amount of oxygen, and that in an ordinary room in the temperate zone the air cannot be changed more than three times in an hour without causing a draft that is unpleasant or dangerous. One thousand cubic feet of air space is then the mimimum for a room (the air of which can be changed three times every hour) necessary to keep that air in proper condition. The bed-room of course needs the most attention, it being ordinarily an easy matter to open the windows of the day room when its atmosphere becomes foul, or even to go out of doors for a change. One difficulty here, however, is that starting with pure air in the room the inmate is not likely to notice the gradual contamination until it becomes excessive, while another person entering from without finds the atmosphere oppressive. In the unconsciousness of sleep the bed-room air may of course be much further polluted.

The double window, sometimes used in winter, tends to make matters worse, and many bed-rooms have no fireplace to aid ventilation even in a slight degree.

I presume every practising physician has had experience of this digusting bed-room air stink. Then there is that abomination, the alcove, with, in some cases, about floor space enough to hold the bed, a wash-stand, a chair, and a trunk; and, to make matters worse if possible, in some cases a heavy curtain, reaching from the ceiling to the floor, between the alcove and the living room. Nor can those bed-rooms abutting upon a well or air shaft be regarded much more favorably. This condition of things exists in Cambridge in some of the private buildings and in some of the college halls. We know that the sun is the great life-giver, and I read in good authorities that direct sunlight is a powerful germ-killer. There are many bed rooms in the lodging houses, private buildings and college halls in Cambridge into which no ray of sunlight has ever penetrated since they

were first enclosed within four walls. Last year the Boston Board of Health passed some regulations providing, among other things, that every building used as a stable for cows should contain at least 1000 cubic feet of space for each animal, and be well lighted and ventilated. Is the health of a man of less importance than the health of a cow!

Good food in proper quantity is another important factor in the preservation of health. A healthy organism is not built up out of poor material. We are careful to have an engine which is intended to do first-class work constructed of good stuff, and supplied with the right kind of fuel to run it properly. In man food is the stuff of which the engine is built, and the fuel with which it is run. Some here have had occasion to see professionally students in straitened financial circumstances struggling to get an education, while trying to keep body and soul together on food deficient in quantity or improper in quality, or both, and to note the injurious effects produced thereby on mental and bodily health. It is pitiful, it is heroic, but it is unphysiological, and will sooner or later, in the majority of cases, bring disaster where success was so richly deserved. Surely the intellectual agonist needs food proper in quality and quantity no less than his brother, the physical athlete.

The moral life of men is confessedly a difficult subject to handle, and in connection with it we realize vividly the truth of the words: "The evil that men do lives after them." In the case of undergraduates, however, the opportunities for effecting improvement in this direction are, I think, such as are offered in an equal degree by no other place or time. Most students enter college at an age when the habits are still in a semi-fluid state, though soon set into rigidity. In such a condition of affairs they should be open to good as well as to evil influences.

They are also collected together within a comparatively small area, and an arrangement could easily be made giving

them access to a competent college officer, who should discuss these matters with them, not dogmatically, but as one man with another. The formal lectures and addresses to students inculcating upon them man's moral duties I believe to be in the majority of cases utterly worthless. In some cases, perhaps in many, an act that may blast the whole after life, and entail misery upon others than the original sufferer, is done in ignorance of the far-reaching and disastrous results that may follow in its train. Not infrequently the interval between cause and effect is a long one, and few, save those specially trained, will seek the explanation of an illness in an action many years antecedent, even if it has not entirely escaped the memory. No better opportunity could be offered than that supplied at a great university for supervising the conditions that affect health, and for benefiting in innumerable ways the health of those who have enrolled themselves as students within its walls. I would therefore suggest, subject to such modifications as the circumstances of particular cases might render necessary, the appointment of an official to be known as the Medical Officer of Health to the University, or College, whose qualifications and duties should be somewhat as follows:

The Medical Officer of Health to the University.

He shall be a doctor of medicine, but while holding this position he shall not be engaged in the practice of his profession, nor shall he hold any other position to which emolument is attached.

He shall have supervision of the sanitary condition of all the buildings belonging to the University, visiting them frequently, and reporting thereon to the proper authorities at stated times, and at any time when, in his opinion, immediate action is necessary.

He shall make an arrangement with the local health authorities whereby he shall be kept informed of the sanitary

condition of all buildings, not belonging to the University, wherein members of the University lodge, and also of the occurrence in said lodging-houses of such diseases as are required to be reported to the local health authorities. All members of the University shall be at liberty to communicate with him regarding any supposed insanitary conditions of their lodgings, and he shall cause said conditions to be investigated, and, so far as lies in his power, take measures for their abatement.

He shall satisfy himself that any member of the University who is ill receives proper medical attendance.

He shall have daily office hours wherein he may be consulted on sanitary and hygienic subjects, but any advice he may give shall not extend to the treatment of disease.

He shall, free of charge, examine, and certify to the condition of, any student applying for pecuniary aid to the University.

He shall keep a record of the health of each student previous to his joining the University, which record shall be made out by the parent or person standing *in loco parentis* upon a blank form supplied for this purpose; and said record shall be a confidential communication to the Medical Officer of Health.

PROPOSED FORM OF RECORD.

Name. Date of Birth. Birthplace.

Has he been successfully vaccinated?

Has he had measles, scarlet fever, whooping cough, rheumatic fever, hernia, any heart affection, or any other serious illness?

Has he had good health from birth? If not, give particulars. (Statement of family physician will be of great value.)

Is there anything in his condition that would make taking part in athletic contests undesirable?

FAMILY HISTORY.

	Living.		*Dead.*	
	Age.	*Health.*	*Age.*	*Cause of Death.*
Father				
Mother				
Brothers				
Sisters				

Is there any constitutional or hereditary disease in the family other than appears above, *i. e.* among uncles and aunts?

Is there anything else which it would be well for the Medical Officer of Health to know?

Signature, ...

Relation of signer, ...

This is a confidential communication.

Should some such plan as this meet the approval of the Massachusetts Medical Society, I think its chance of adoption would be materially improved.

THE DIET OF HARVARD STUDENTS.

BY ROBERT W. GREENLEAF, M.D., OF BOSTON.

HARVARD of to-day numbers in her academic department one thousand five hundred and ninety-eight (1,598) students. In her other departments at Cambridge are eight hundred and twenty-two (822). As law, clerical and other students dine side by side with the undergraduates, the total number, two thousand four hundred and twenty (2,420), is taken as a basis for this inquiry.

The dining places of one thousand nine hundred and forty-two (1,942) students have been ascertained. These are one hundred (100) in number. For our purposes they may be grouped as follows:

Group A includes the boarding places. Four hundred and thirty-one (431) students, including those who board at home, have been ascertained to take their meals at such.

The charges at these places varied from $4.00 to $8.00 a week for food alone, $8.00 being the more common charge. As to quality of food it varied from indifferent to very good, *i. e.* good as judged by old time standards of cooking. In no case did I find any knowledge of what I may call modern scientific cookery, consequently all are illustrations of the wasteful methods characteristic of New England cookery.

One advantage possessed by these places is that in them the agreeable conversation of a few congenial friends is likely to be at hand to aid digestion, which, if not completely neutralizing the ill effects of possible improper food, is likely to inculcate a desire for dining in restful ways, a habit which will go far, in his later days, towards turning a man from that evil of modern business life, the hasty standing lunch.

Group B includes the Cambridge restaurants.

About two hundred (200) students regularly board in these, and others take occasional meals at them.

I have data of five such places, where, from the eggs on toast of John of the Holly Tree Coffee House, are to be found meals supposed to suit all tastes and purses. The charge at one table was $3.50 a week, then through the cafés, such as "Allnut's," "The Crimson," and "Belcher's," they varied up to $8.00, each being about $1.00 more costly than corresponding places in Boston. The quality of the diet varied in the same ratio.

Only one of these restaurants can be called first-class. At that the table was excellent. Food was well served in several courses, noticeable among which were delicately cooked meats, salads, etc. But it is not conducive to the enjoyment of a meal, nor can one recommend it from a sanitary standpoint, to eat in a dingy basement, ventilated from a dusty business square, nor is it well to pay so much for meals. Eight dollars a week is a needless extravagance for a student.

Of the diets of the lesser-cost places, the less said of them the better. They, or their results, are well known to our profession. Their tough steaks, their unsavory vegetables, improperly cooked and poorly served, are as capable of supplying us with anæmic, dyspeptic patients from the stalwart ranks of student life as from the young men and women clerks and tradesmen here in town. Indeed some of us, perchance, have learned that while certain medical students are being provided for at the bountiful tables of the athletic or other club, many a student is struggling with "fried ham," a "side order of pie," and "a cup of tea" at some cheap restaurant.

It is pitiable to see the "mealers" at these places. (For there, as at all, I took especial notice of the apparent condition of those I met at table.) They deserve our fullest

sympathy. All of us ought to know that the means for relief are at hand, and only need our intelligent aid to have them widely spread.

Group C., viz., of large dining halls, in part, at least, under the surpervision of the University. Of this group there is but one representative. But in this one, Harvard has a part of a splendid "Memorial" to her sons who fell in war in which she may well take pride. Here in the great hall set aside for dining purposes, surrounded by the portraits of illustrious older brothers, nearly eleven hundred (1,100) students daily dine.

Probably at no time in the history of Memorial Hall has it been so successful as at present. It is fortunate in the possession of an energetic, faithful steward and of judicious officers. Its table, with trifling exceptions, has given more satisfaction than ever before. The food was found to be of excellent quality. The price of board has averaged less than $4.00 a week throughout the year, though most students pay rather more than this by ordering extras. You may well ask what more could be desired? and why not duplicate this as nearly as possible as the best method of supplying students with meals?

Certain defects were noticeable at Memorial. In the first place, whereas the Dining Hall may easily seat five or six hundred students at a time, to-day it must provide for twice as many. This is accomplished by reserving about one-third of the tables for a general table, *i. e.* where, just as in a hotel, the first to come are first served. The greater number of tables are still, as of old, club tables. This plan works fairly well for the most part, but every now and then there happens what never should happen, viz., a harmful over-crowding. Picture to yourselves the unwieldy sections of the great Freshman class swarming in after a lecture, all hungry for lunch. It is not conducive to good digestion to have an indifferent waiter bring you an

uninviting jumble of food, nor does it help matters to know that your hungry friend and classmate awaits his turn behind your chair, eagerly eyeing your every mouthful. It is not to be wondered at that feeing of waiters may double the price of board, nor that every now and then little clubs of students seek other tables elsewhere. It is to be said, however, that few such withdrawals have occurred during the past year.

Another curious drawback to Memorial arises from the privilege of ordering as many "helps" (one at a time) as a student pleases, a privilege which is abused in certain cases to the extent of gluttony.

None but spoiled children, with no idea of self-restraint or the fitness of things, would think of ordering eight "helps" of eggs on toast or of roast lamb, yet I am assured that such inexcusable waste is by no means confined to single cases. I personally saw fine cuts of beef sent back because the dainty exquisites fancied there was a trifle too much gristle or fat to suit their would-be majesties. The needless waste of such a character at Memorial is no small item of expense. This, added to the waste inherent in the old-fashioned system of cooking and selection of food, adds considerably to the expense of board at Memorial.

Regarding the other source of diet harm, viz., the starving of students from too limited a diet, we must look elsewhere. Such certainly is not likely to occur at Memorial.

During the past year the public has been treated to a series of articles in the daily press, such as "The Poor Man at Harvard," "Students' Expenses," etc., and a fear has sprung up that, in certain places, students were practising a too rigid economy; that to come within the $400.00 or $500.00 quoted as figures on which anyone could easily go through Harvard, they were injuring their health, perhaps permanently. The next group of student opportunities will shed some light on this problem.

Group D. Miscellaneous and Student Experiments.

This is a veritable curiosity shop. Yet even here, where some approach to modern methods might have been expected, in no instance did I find a steward or a landlady who had any idea of the relations of proteids and carbohydrates or of any method of cooking other than the one she had been brought up in.

These experiments were by no means all along the line of economy. I will take them up in the order in which they are most nearly related to methods already considered.

1. The table of the Episcopal Theological Seminary has the best reasonably priced table I found in Cambridge. It provides food for $5.00 a week to outsiders, and $4.25 to the students of the Seminary. I refer to it, though the Seminary is not a part of the University, since, besides the forty-three (43) theological students, twenty-nine (29) law students are fortunate enough to sit around its cheerful board.

2. A private table formed by and under the control of students, the so-called "21-club," which started with that number and has admitted to membership only a few others since. These students, being desirous of living as economically as possible, rented a dining room and employed a woman to cook for them. One of their number was chosen to act as steward, and, thanks to his skilful direction, the club has thriven for the low sum of $2.50 a week. The members have not starved. They all appeared in good condition, and evidently enjoyed their pleasant table as much as the sitters at the more pretentious ones.

3. As to the students who prepare their own meals, I heard of a few, but I did not feel authorized to make the necessary investigations to ascertain how many such there are. It is to the great credit of Harvard that she numbers among her officers gentlemen who quietly and unobtrusively seek out such needy men and as quietly put them on their feet if possible.

4. Curious experiments in the direction of cheap living, which are to some extent made use of by the students, are the five-cent sandwich counters of the midnight lunch car, also a similar counter of an enterprising tobacconist, who serves some seventy-five dozens of sandwiches daily to students, besides coffee and similar beverages. I understand that it is not unusual for students to breakfast and lunch at this place, and then go to their Boston dining headquarters for a hearty dinner.

In this connection I ought not to omit mention of that interesting individual, John the orange man, who, now-a-days, arrayed in gorgeous crimson, and provided with a donkey cart, the better to meet the needs of his more numerous student customers, greets his "frinds" at every college game, as he has done for many years, with oranges, bananas and pop-corn.

These limited opportunities are in striking contrast with those which have crept into Harvard of recent years, viz.:

5. The tables of certain club-houses comparable to those of metropolitan life. At present this element is so relatively small and out of keeping with the prevailing sentiment at Harvard that, for the purposes of this paper, it may be disregarded.

6. Another interesting student club consisted of young men, sixteen in number, all of whom had been at Memorial. They unaminously preferrred their cosy dining room to Memorial's great hall. Their food was no better and the cost was more, averaging about $5.00 a week.

The especial interest in this club, besides the evident enjoyment the members took in their table, lay in the fact that it had been reported to me as having tried the Aladdin oven of Mr. Atkinson. It had not proved a success in their hands, and they had returned to the usual ways of cooking. On inquiry of their cook, a colored woman, to whom they had entrusted all the duties of cook, steward, etc., it appeared

that she had tried to manage it about as she would an ordinary oven, and was disappointed that she could not cook as rapidly in it. She did not understand the principle of this oven, and her untrained efforts resulted in failure. So that while students of our Institute of Technology, of our Museum of Fine Arts, of several schools in Boston, also many employés of our larger mercantile houses, numbering nearly one thousand persons, have been rejoicing in wholesome, economical and most satisfactory lunches cooked in part by the use of the Aladdin oven, she had brought momentary shadow on the one loophole for light I found in the present darkness of Cambridge diets.

7. Two other experiments among students are of especial interest. One of these is the Foxcroft club. Here two hundred and seventeen (217) students take their meals, the college furnishing them with quarters. This club reflects great credit on its members. They manage it with surprising business insight. Meals are served "a la carte." The bill of fare on page 214 shows the cost of the various dishes.

I was prepared to find that a number of students were stinting themselves dangerously by boarding on this plan. Such was not the case. A considerable number of orders examined confirmed the statement of the officers that the board averaged $2.80 per week, and that few, not exceeding 10 per cent., ordered with a view to especial economy. All were safely above the danger line, as far as I could see, and I was informed that but two students had harmfully stinted themselves during the past year. Certainly the tendency to overeating is reduced to a minimum by such a system, and as to selection of food which would furnish a proper proportion of nutrients, the carbohydrates, the proteids and fats, it was surprising to see how nearly the different "orders" would conform to dietaries which have been ascertained by physiologists to meet the requirements of the body. Most of

FOXCROFT CLUB.

HOURS FOR MEALS.

Breakfast, 7.30 to 8.50; Lunch, 12.30 to 1.30; Dinner, 5.30 to 6 30.
Sunday: Breakfast, 8 to 9.30; Lunch, 12.30 to 1.30; Dinner, 5.30 to 6.30.

Tea,	3 cts.	White Bread (2 slices),	1 ct.
Coffee,	3 cts.	Graham Bread (2 slices),	1 ct.
Cocoa,	3 cts.	Corn Bread (1 piece),	1 ct.
		Rolls (each),	1 ct.
Glass of Milk,	2 cts.	Graham Gems (each),	1 ct.
Bowl of Milk,	4 cts.	Crackers (plate),	3 cts.
		Doughnuts,	1 ct.
Butter,	1 ct.	Gingerbread (1 piece),	1 ct.
Cheese,	1 ct.	Cookies (2),	1 ct.

PIES.		FRUIT.	
Apricot,	5 cts.	Apples,	2 cts.
Mince,	5 cts.	Bananas,	2 cts.
Apple,	5 cts.	Oranges,	cts.
Cranberry,	5 cts.	Preserves,	4 cts.
Squash,	5 cts.		

BREAKFAST AND LUNCH.

Oatmeal and Milk,	5 cts.
Wheat and Milk,	5 cts.
Hominy and Milk,	5 cts.
Rice and Milk,	5 cts.
Dry Toast,	2 cts.
Buttered Toast,	3 cts.
Cold Meats,	10 cts.
Beefsteak (for Breakfast),	10 cts.
Hot Potatoes,	2 cts.
Baked Beans,	4 cts.
Eggs (2) Boiled (1-2 order 1-2 price),	8 cts.
Eggs (2) Dropped, " "	8 cts.
Fried Eggs (2), " "	8 cts.
Eggs (2) on Toast, " "	10 cts.
Egg Omelette,	10 cts.
Soup for Lunch,	4 cts.

DINNER.

Fish,	10 cts.	Stew,	9 cts.
Roast Beef,	10 cts.	Potatoes,	2 cts.
" " 1-2 order,	7 cts.	Vegetables,	3 cts.
Roast Lamb,	10 cts.	Pudding,	5 cts.

Other Dishes at the Discretion of the Steward.

the men at the Foxcroft club appeared in excellent condition. I saw no overfed ones, and the few especially pale-faced men who were noted appeared to owe their condition more to overstudy and insufficient open-air exercise than to especially deficient nourishment. It was of interest in this connection to learn that certain of the strongest men in college board at the Foxcroft club, and are but average eaters there.

The Foxcroft has certain defects, arising partly from lack of funds and partly from lack of proper sanitary supervision, which I need not here consider, moreover, it was obvious to me that low as the students had managed to bring their food expenses, they could have had better results at less cost by the introduction of improved methods of selection of food and of cooking.

The Foxcroft club is an interesting experiment in other ways. It has a reading room, an extensive book and furniture bureau, and, though under student supervison, is as useful a means of aiding the needy student without causing loss of self-respect and the harm incident to high-pressure competition as exists to-day in Cambridge.

8. The last of the students' experiments to which I shall refer is that of the training tables for the athletes. There are several such, and it is a pleasure to note the improvement that has taken place since the days of beef and little else. It goes far to show what can be done when advisory power is placed in the hands of those who have made the question at issue a study.

Thanks to the courtesy of Dr. Conant, their medical adviser, I was afforded excellent opportunities for observing not only the tables of the "crew" and "nine," but the men who dine at them. Under Dr. Conant's wise counsel food of various kinds was abundantly supplied. The charge of $10.00 at one table and $11.00 at another, under trustworthy and interested providers, secured the best meats, fruits and vegetables the market could furnish.

In proof of the wisdom of these changes is the present condition of the athletes. Boils and breakdowns are practically things of the past. In the rare instances in which they do occur the cause is generally found in the fact that the men have studied hard for examinations, losing their sleep, etc., in addition to the hard work of the training. Even a physician holding the unique and almost paternal relation of Dr. Conant cannot always have his advice followed relating to such matters.

Summary and Conclusions.—In this paper I have endeavored to show, as a preliminary inquiry, simply the character of the different dining places at which Harvard students take their meals, including such questions as the number of students at each, and the quality, quantity and cost of the food. I have found that at all the places the food was of the usual New England character, which is well known, and which has been carefully studied as to chemistry and cost by others.

The features in which they essentially differed were chiefly as regards methods of administration. Less than half the students were provided for by a plan carrying the official sanction of the University, and I found that the students were petitioning to have the College provide increased opportunities for their use. It is a serious question whether institutions for higher education should undertake to provide food for their students, whether or no they would not be justified in saying to them: You come to us for a higher education. We will teach you how to use the microscope, the telescope; how to interpret the hieroglyphics of bygone races, and how to lead the present, but as to problems relative to your food, raiment and the like, you ought to be sufficiently informed on such matters to properly provide yourselves according to your tastes and purses without our aid.

It certainly would seem a pity to give up Memorial Hall,

though there are very good reasons why it would be well to do so; nevertheless I have come to the conclusion that it is not premature for a University like Harvard to decline to undertake further responsibilities of such a character.

Observation of the student tables shows a distinct advance in certain respects. Two of them have succeeded in providing tables at nearly half the cost of Memorial; and, as to quality of food, though not quite as good, are only a short distance behind. One of these tables has an advantage which Memorial lacks, viz., an approach to the delights of a home table, and the other has certain advantages of a club-house, viz., a pleasant reading room, which is conducive to a moment's quiet after eating.

While it appears that a University may safely and without danger to the students give up the immediate care of their meals, it is certainly a mistake to decline to give instruction or to advise in such matters.

New England people, as a whole, are altogether too deficient in a knowledge of dietetics to take it for granted that information on such matters is sufficiently diffused to suppose a proper knowledge possible on the part of the students. My observations have shown me that even our cook-books and cooking schools are, for the most part, exponents only of old-time methods, however good they may be. Though it is beyond the scope of this paper to explain the improved methods, yet, as they bear so intimately on the solution of the problem at Cambridge, I will refer briefly to the important sources of information near at hand. Mrs. Ellen M. Richards, of the Massachusetts Institute of Technology, has made a very extended study of the subject, and has incorporated her ideas in the New England kitchen, which, with small quarters in a poorer district of the city, has provided the best of food, of the simpler kinds, at a moderate cost. The lunches, referred to in the early part of this paper, were cooked at this place. From a careful study of the

nutrients needed at different ages she has constructed tables which show how the relative proportions of carbohydrates, proteids and fats change at different ages.

She has kindly permitted me to show you the diagrams, which illustrate graphically the curves found to maintain. These are to appear in a forthcoming work on dietetics. A partial abstract of these tables is as follows. The figures are approximately the average:

	Years	5	10	15	20	25	30	35	&c.
Weight in Grammes.	Carbohydrates	190	200	350	448	510	480	450	"
	Proteids	60	68	118	120	130	125	120	"
	Fats	42	54	68	84	94	100	100	"

The carbohydrate curve is found to coincide quite closely with the curve of growth in weight, as shown by Prof. Bowditch in his studies on growing children. And a glance at such a table shows the importance of understanding the constituents of foods in order to supply the proper kinds. *E. g.*, the constituents indicated above, as needed at the age of 25 years, represent very nearly what is actually supplied the soldiers of the German army. The old-time meaty tables of our athletes were scarcely in accord with such an estimate. Besides the knowledge needed regarding the relative amount of nutrients in the different kinds of food, our people need instruction in methods of cooking. Among various improvements there are bakers' ovens, steam boilers, etc., etc. Then the oven of Mr. Atkinson is worthy of use, especially in places where economy is aimed at. Some of you will recall a bountiful repast provided by Mr. Atkinson before our Suffolk District Society, where finely-flavored roasts, puddings, and various other articles were served for about one hundred and fifty persons. The entire cost for fuel (viz., oil) used in cooking the food was but 15 cents. Such a repast was a lesson in economics. It demonstrated not merely the immense saving possible in fuel, but the

possibility of thoroughly cooking food without filling a house with objectionable or wasteful odors. By his process of cooking the temperature of the oven is kept at so low a heat that there is practically no loss in smoke or steam. Indeed there is no chimney needed for this kind of an oven. Moreover, every part of a piece of meat is well cooked, so that the tough steak of the boarding-house becomes the tender, juicy, rich-tasting morsel, comparable to the choicest fillet of the epicure, a matter of no small consequence when the purse can only afford the cheaper "cuts" of the market. Mr. Atkinson's book, "The Science of Nutrition," incorporates many careful computations regarding dietaries, prepared under the direction of Mrs. Richards and others proficient in this subject. My observations on the results of their knowledge, which have extended over the past six months, lead me to conclude that a plan could be framed for providing any number of clubs of students with well chosen, well cooked meals at less cost than what was found at any of the tables at Cambridge.

Another source of information on the subject of the relative amount of the different nutrients in different kinds of food, together with the amount of working force each possesses, is in the various reports by Prof. W. O. Atwater, of Wesleyan University.

In the annual reports of the Storrs School at the Agricultural Experiment Station, also in a report of the U. S. Commission of Fish and Fisheries for 1888, on the "Chemical Composition and Nutritive values of Food-fishes and Aquatic Invertebrates," are an extended series of tables showing the relative value of a great variety of foods. Such reports will do much towards widening our knowledge of useful foods, and of introducing them to our tables. The general absence of useful foods, such as fishes, salads, cheese, etc., was noticeable almost everywhere in Cambridge. Professor Atwater's reports show,

moreover, that it is no longer necessary to go to Germany for instruction regarding such matters. We already can secure it at home. To the knowledge of dietaries in use abroad by soldiers, farmers, etc., which have been investigated by eminent German physiologists and others, Prof. Atwater has added extensive data on the dietaries of our operatives in various industries, our football players, our College Professors, etc. An application of such knowledge cannot fail in being productive of good results to the students of our Colleges, and it is to be hoped that in the present great need for increased facilities for diet purposes at Harvard, plans will be matured which will incorporate a knowledge of what may be called Modern Scientific Cooking.

DISCUSSION.

Dr. H. P. Walcott, of Cambridge.—I shall occupy but a very few minutes, and will do so in simply calling attention to the attitude of the people at Cambridge, who are responsible for the administration of the University. It is needless to say, I hope, in entering on this discussion, that every one of the papers read contains abundance of excellent suggestions with which I fully agree. But it should be remembered that Harvard College during recent years, at any rate, has adopted the principle of non-interference as far as possible. Forty or fifty years ago the student came to Harvard College at the age of fifteen or sixteen years, incapable of looking after himself under his new condition of life, and his parents never meant at that time that he should be his own master. The college made many rules for him to go by. He was obliged to attend divine worship; he should be in his room at 9 o'clock at night; he could not be in Boston later than 10 o'clock on Saturday nights; and so on. In the course of time things changed very much, and the col-

lege authorities adopted the principle of entire liberty as far as possible. With this they introduced the election of studies, and relaxed their careful watch of the student's habits of life. At the same time it is to be remembered that the average age of the Harvard student was gradually increasing until now 18 and 19 is the average age of the Freshman. And I think that the general feeling among the corporation officers at Cambridge is that a young man of 18 or 19 years of age probably comes to Cambridge with the habits of his life pretty well formed; that he represents at that time what his family chooses to have him; that no especial influence over his habits will be brought about by the college. At any rate they appreciate that at that age many young men are entirely dependent upon themselves in the city of Boston with still less to guide them than at Cambridge. Therefore, the logical position of the authorities would seem to be this, I think: That they should offer to the student all the advice and the opportunities for getting the best advice that can be procured. Whether there are any means by which you can make a student take advantage of that advice, and live according to certain healthful rules of life is certainly very doubtful. The responsibilities of his life and health ought to be in his own hands. The student should not create any conditions of his own that are unfavorable to health. When it comes to the vexed question of athletics, about which Dr. Conant has talked to us, it seems to me that athletics are matters of very little consequence. They include very few of the young men, and I regret to say that I think they have not done any good. I do not think we get much good from nine young men playing base-ball, and when it comes to playing foot-ball we are reminded of what Scott says in Ivanhoe, where one man was killed and several wounded. I think it is very descriptive of one of those games of foot-ball.

What the college is endeavoring to do is to offer an opportunity to the student for indulging in all the out-door sports.

The conclusion, so far as the authorities at Cambridge go, is to let these 2,500 young men work out their own salvation, with so much assistance as they can properly give them.

Dr. S. W. Driver, of Cambridge.—I am naturally optimistic, but some of the readers would seem to hold the opposite view.

In considering the influence of college life on health we have to consider three great classes. I would say that were we to take the two thousand odd men at Harvard College and turn them loose into the city of Boston to do for themselves, at the ages they are at Harvard, with all their varying circumstances, for four years, and then take the same number from the city and put them in Harvard College, and compare them, I believe the two thousand coming from Harvard College would stand the comparison better.

Under the first class at Harvard I would include those students that have abundant means. They have too much, and I believe that the great temptations they are open to are licentiousness and intemperance. This class, I believe, stand a better show in Harvard College than outside of its walls. The moral influence of Harvard has some effect upon a student. There is a sort of supervising influence, there is his society life, his club life, the discipline at recitations, etc. Then, lastly, I take up the influence of athletics upon him. They take up his time and draw him away from the devil's work which comes from idleness. I can demonstrate it and I believe it.

Then there is that great middle class, which, as we all know, represent the great body, and those composing it are the men who get all the good out of college life. Their great danger is from over-work, from ambition. From among them and from the next class we have the cases of over-work. They are well fed, well clothed, and well housed.

Now comes the third class. The great class that are attracted to Harvard at the present time with offers of aid. The class that are making their own way in the world. That class, I think, have a better show at Harvard than if they were placed in a large city and had to pick up their meals, and put up with poor lodgings. I know something about them. I was one of them. I believe they have a better chance at Harvard at the present time. There is a tendency at Harvard, and I am glad to say it, among the class that has too much, to give to the class that has not

enough. So that, I believe, the future is brilliant for these men.

I believe that notwithstanding all the criticisms that have been passed, college life, as I see it at Harvard, counts for health—moral, mental and physical.

ARTICLE VII.

DIPHTHERIA AND OTHER MEMBRANOUS AFFECTIONS OF THE THROAT.

By FRANCIS H. WILLIAMS, M.D.
OF BOSTON.

READ JUNE 14, 1893.

DIPHTHERIA
AND OTHER MEMBRANOUS AFFECTIONS OF THE THROAT.

In discussing this subject, there are three principal points to which I shall have the pleasure of calling your attention this morning. *First*, the diagnosis of diphtheria by means of the microscope. *Second*, the coincidence of diphtheria and other diseases. *Third*, the treatment of diphtheria.

The report of the State Board of Health for 1891 gives valuable tables, prepared with great care by Dr. S. W. Abbott, which show the mortality of various diseases in Massachusetts from 1871–1890, inclusive. From them it may be seen that during these 20 years there were

56,474 deaths from pneumonia;
36,553 deaths from diphtheria and croup;
19,421 deaths from typhoid fever; and
14,639 deaths from scarlet fever.

I shall show later that even this large figure of 36,553 deaths from dipththeria and croup probably does not represent all of the fatal cases of membranous throats during the twenty years. Osler states that while other contagious diseases have diminished within the past decade, diphtheria, particularly in cities, has increased. Moreover, the mortality in this disease is very high, from 40 to 60 per cent. of the patients dying.

Precise discrimination between different kinds of membranous throats was formerly impossible, but within the last ten years, beginning with the careful observations of Klebs and Loeffler, it has been shown that among membranous

affections of the throat there is one of supreme importance which is characterized by the presence of an organism known as the Klebs-Loeffler bacillus. There are often other organisms present with this bacillus, but they are not of such serious import. These other organisms, chiefly various forms of cocci, may also be found in the throat without the bacillus, but associated with such appearances that they often cannot be distinguished from those accompanying the bacillus, except by the aid of the microscope. It has been agreed to call the most fatal of these membranous inflammations of the throat, the disease identified by the Klebs-Loeffler bacillus, diphtheria; certain other forms of membranous throats are often designated as pseudo-diphtheria. Let me recall to your minds some of the characteristics of this bacillus disease, diphtheria. In the beginning it is local; the bacilli grow on or in a mucous membrane or wound, at which point a false membrane is formed; they do not, as a rule, enter the system, although Frosch[1] has found them in various organs of the body at ten out of fifteen autopsies after diphtheria, but their baneful effects are exerted chiefly through a very poisonous substance, diphtherotoxin, which they secrete and which is soluble and readily absorbed. This substance, which is a tox-albumen, has been isolated, and when freed from all bacilli and injected into animals, causes many of the symptoms of dipththeria, such as paralysis, heart failure and local necrosis, but it does not give rise to a false membrane.

The *early* recognition of a disease so dangerous to the individual and to those near him as diphtheria is of the first importance, and yet by the ordinary methods an early diagnosis is not infrequently impossible. It may even in the very early stage be confounded with follicular tonsillitis. Fortunately, we have now in our hands a means of diagnosis

[1] Zeitschrift für Hygiene und Infectionskrankheiten, 1893, Band xiii., Heft 1.

which is excellent precisely in the early stage of the disease. It consists in the examination of cultures made from the suspicious throat and subsequent inoculation of animals; this requires special training and appliances, and it is necessary to wait about 20 hours to learn the result of the cultures, and longer to learn that of the inoculations.

The Boston City Hospital is now erecting much larger buildings for contagious diseases; at present there are two buildings, each containing two wards besides separate rooms, devoted to the contagious service, one for diphtheria and the other for scarlet fever. In the diphtheria wards patients when needing tracheotomy or intubation go to the surgical service, the others to the medical service. Beginning with 1891 I have had during medical services in these wards 442 patients. 211 of these had membranous inflammation of the throat; 231 scarlet fever, complicated in 58 cases with severe membranous inflammation of the throat, making in all 269 patients with membranous throats. The diagnosis by cultures, which I initiated at the Hospital, was made in 93 of the cases of membranous throats that were under my care during about three months of 1892 and 1893. In 3 of the cases cover-glass preparations only were made. These 96 cases are classed as follows:

TABLE I.

	Cases.	*Rec.*	*Died.*
Diphtheria, - - -	40	20	20
Diphtheria and scarlet fever,	12	6	6
Diphtheria and measles, - -	1	1	
Diphtheria and typhoid fever,	1	1	
Pseudo-diphtheria, - -	19	17	2
Pseudo-diphtheria and scarlet fever,	23	18	5
	96		

These examinations showed that a considerable number of the cases with false membranes that were admitted to the diphtheria ward were not diphtheria, thus demonstrating the necessity for bacteriological examinations. Furthermore, in four of those that were diphtheria, there was no membrane in sight. This likewise shows the importance of a bacteriological examination where there is the least suspicion of diphtheria.

Let me now direct your attention to these 96 cases in which the diagnosis was made by means of the microscope. My plan was to have a sterilized cotton swab rubbed over the throats of all patients coming to the medical side of the diphtheria ward, except those too weak to be disturbed, and over the throats of all those in the scarlet fever ward who might at any time have a deposit in the throat, and cultures were then made, except in a few instances, where cover-glass preparations only were made. These 96 cases consist of two series: the first series of 23 cases in 1892, from which the cultures, followed in some cases by inoculation of guinea-pigs, were made for me by Mr. A. P. Mathews, assistant in biology at the Massachusetts Institute of Technology, to whom I am much indebted, and a second series of 73 cases in 1893, for which I enlisted the interest and coöperation of Professor Councilman, under whose direction the cultures were made, and of Dr. E. M. Holden, who gave freely the large amount of time which work of this character requires and on which its success so much depends. In 49 of the 96 cases, Table II., I made a preliminary cover-glass examination, when I first saw the patient, from the material adhering to a sterilized cotton swab directly after it had been rubbed over the suspected throat—this examination can be made in a few minutes in the ward or at the patient's house—and on the following day learned the result of the examination made from cultures. If either examination shows the characteristic bacilli every precaution should be taken.

TABLE II.

Diagnosis of diphtheria based on cultures. Both cultures and cover-glass examinations made.

Diphtheria, - - - - -	20
Diphtheria and scarlet fever, - - -	3
Pseudo-diphtheria, - - - -	8
Pseudo-diphtheria and scarlet fever, - -	10
Tonsillitis, - - - - - -	6
	47

In 38 of these 47 cases (cases 48 and 49 will be referred to later), the cultures and cover-glass examinations agreed, in 7 disagreed, and in 2 cases the result of the cover-glass examination was doubtful. Two of the 7 cases where the two methods disagreed are classed in the table as pseudo-diphtheria, the bacilli not being found in the cultures, although thought to be present in the cover-glass examinations. These two patients died. The third case is classed in the table as pseudo-diphtheria and scarlet fever, as the bacilli were not found in the cultures, although thought to be present in the cover-glass examinations. The brother of the patient had diphtheria and scarlet fever. In the fourth case, where the two methods disagreed, I probably mistook some other organism for the bacillus on the 14th day of the disease. In the three remaining cases I failed to find the bacilli in the cover-glass examination, but they were found in the cultures. In the 48th case, not noted in Table II., the bacilli were found in neither culture nor cover-glass examination, but the patient did not enter the hospital until the 35th day of the disease; she had post-diphtheritic paralysis on the 33d day of the disease.

The preliminary examination is of service when the cover-glass shows abundant and characteristic bacilli; it seems to be more satisfactory in the early stages of the disease than

in the later stages; in the latter the bacillus is more apt to be obscured by slower growing organisms; failure to find the bacilli does not establish their absence, and the cover-glass examinations should of course be followed by cultures.

The cultures are not infallible; for some reason, such as the presence of a small quantity of corrosive sublimate, the bacilli may not grow when planted and therefore may not be found in the cultures. With all the sources of error, however, we now have at our disposal a method of diagnosis better than anything we have had heretofore, which enables us to recognize early the most dangerous among the acute diseases of the throat which are characterized by a membrane. It is a great relief to the family and friends, as well as to the physician, to have such assurance as this means of diagnosis gives us, that certain apparently most serious cases are not cases of diphtheria. It likewise points out to us mild cases of diphtheria, that clinically might be classed as pseudo-diphtheria, but the contagion from which might give rise to a serious illness in another individual. By its aid also we may learn in the future to recognize better the symptoms that distinguish diphtheria from other membranous affections of the throat. Further, it shortens the stay of the patient in the hospital and diminishes the period of convalescence for those who have had only pseudo-diphtheria, as unless we can distinguish between them we are compelled to be over-careful of the cases in which the after effects are not so much to be dreaded. As a rule, patients in whose throats the bacillus is not found may get up early, while in the cases of diphtheria one should make haste slowly, as even lifting a child out of its crib to feed it may bring on heart failure some time after the acute symptoms have disappeared. Likewise it may sometimes be of great importance to summon the family or friends from a distance if we are assured early that the disease is a very dangerous one.

Patients will be more ready to submit to isolation and families to quarantine if the disease is known to be diphtheria, and not, perhaps, a comparatively harmless membranous affection of the throat.

Diphtheria usually begins on the tonsils, so far as my experience goes. It is sometimes stated that when the false membrane is limited to the tonsils the disease is not diphtheria, but that if the membrane covers also other parts of the throat, the disease probably is diphtheria. Let us consider for a moment what bearing, if any, the distribution of the false membrane has upon the diagnosis. In the 23 cases of scarlet fever complicated with pseudo-diphtheria (Table III., p. 234) the membrane was limited to the tonsils in five only, and in three it had evidently extended to the larynx. In two cases of pseudo-diphtheria (Table I.) the membrane had also extended to the larynx.[1] These five laryngeal cases were children, the eldest of which was five years old. In four of the forty diphtheria cases (Table I.) there was no membrane in sight; in five the membrane when first seen was on the tonsils only, but it spread later to other parts. In one half of the pseudo-diphtheria cases (Table I.) the membrane was on the tonsils and other parts. These facts show that in making a diagnosis it is not advisable to place reliance upon the distribution of the membrane, although it seems usually to be more widely distributed in diphtheria than in pseudo-diphtheria.

Extreme youth, the presence of membrane in the larynx, or even lower, and a weak heart, all influence the *prognosis* most unfavorably.

We now come to the *second* point, the *coincidence* of diphtheria and other diseases. First let us consider the coincidence of diphtheria and scarlet fever, the occurrence of which has been questioned and much discussed. In the series of cases of both 1892 and 1893, already alluded to,

[1] Intubation or tracheotomy may become necessary in pseudo-diphtheria.

such association occurred. In 97 cases of scarlet fever the diagnosis was made by cultures in all those that had membranous throats. The result was as follows:

TABLE III.

	Cases.	*Died.*
Scarlet fever, - - - - -	62	8
Scarlet fever and pseudo-diphtheria,	23	5
Scarlet fever and diphtheria, -	12	6
	97	

In one of the 12 cases of diphtheria complicated with scarlet fever, diphtheria was followed by scarlet fever, in one preceded by scarlet fever, and in ten cases diphtheria and scarlet fever occurred simultaneously.

A noteworthy point in this table is the fact that there were more deaths among the 35 cases of scarlet fever complicated with membranous throats than in the 62 cases of scarlet fever only; as we should expect, in scarlet fever complicated with diphtheria, it is the Klebs-Loeffler bacillus which is the dangerous factor and which threatens the life of the patient much more than the scarlet fever. In the light of this experience, a former series of my scarlet fever cases is interesting. There were 86 in this series, 19 of which were complicated with membraneous throats, and 67 were uncomplicated. Of the 67 cases of scarlet fever, 3 died, or 4½ per cent.; of the 19 of cases scarlet fever complicated with membranous throats, 9 died, or 47 per cent., showing in this series also the high mortality of scarlet fever when complicated with membranous throats as compared with scarlet fever only. These cases came under my charge before a diagnosis by cultures was made in this community.

The source of some of the cases noted in Tables I. and III. deserves a word in passing. 35 of them came from two Homes for Children. The first Home sent 19 patients

to the hospital between February 14th and March 20th, inclusive. The epidemic began with scarlet fever, of which there were 13 cases, and continued with cases of scarlet fever complicated with pseudo-diphtheria, and scarlet fever complicated with diphtheria, and ended with one case of diphtheria alone; this patient was an adult. The second Home for Children sent 16 cases to the hospital, which included the same variety of diseases as the first.

The coincidence of this bacillus with other diseases than scarlet fever is also interesting. In three of the cases diphtheria and measles probably occurred together; two of these died. The third and only one in which a swab was taken from the throat (Case 49, already alluded to) has a special interest in that the bacilli were detected readily on a cover-glass, by both Dr. Councilman and myself, but they failed, for some unknown reason, to grow in the culture media, although two trials were made. There was abundant opportunity in this case to get some of the membrane, as the child coughed up large pieces of it.

Another case of interest is one in which diphtheria and typhoid fever occurred simultaneously.

L. J., a girl seventeen years old, well developed and nourished, was ill with cellulitis of the leg, with possible caries of the femur, for some weeks before she came into my service. Five days before entrance she complained of sore-throat, and two days later a membrane was seen in the throat, in which Dr. Councilman found the Klebs-Loeffler bacillus. The membrane was seen for the last time on the eighth day after entrance. On the day of entrance the temperature was 104° to 105° and the pulse 130 to 140, but on the following day the temperature reached 105° and the pulse 150; one rose spot was found on the abdomen; the number increased daily for seven days, and were unusually numerous and characteristic. The spleen was en-

larged, and its lower edge could be felt at the margin of the ribs. Hæmoglobin was 90 per cent., and the number of leucocytes normal, 7,500. On the third day the stools were typhoidal and the patient dull. The pulse was 110 to 120, and the temperature remained about 104° for a week and then fell by lysis to normal. Recovery.

These cases suggest a connection between the bacillus of diphtheria and certain of the paralyses which sometimes occur after scarlet fever, measles and typhoid fever. Furthermore, the mortality from diphtheria in our state should include some of the cases classed under scarlet fever, measles and typhoid fever, as already suggested.

We now come to the *third* point, namely, the *treatment* of diphtheria, and this subject divides itself naturally into two parts, general and local treatment. The former may be outlined in a few words. The food of the patient deserves special attention. Alcohol is, in some cases, of service. Iron is frequently given for anæmia. In 19 cases,

Diphtheria,	9
Diphtheria and scarlet fever,	3
Pseudo-diphtheria,	4
Pseudo-diphtheria and scarlet fever,	3
	19

most of which appeared anæmic, I determined the hæmoglobin by Fleischl's hæmometer, and this instrument did not, in the majority of the cases, confirm the apparent anæmia. 16 of these 19 cases, children and adults, had about and in some cases more than 100 per cent. of hæmoglobin. The three remaining cases were all children. In the first of these, a child five years old, ill with diphtheria, the hæmoglobin was 75 per cent. In the other two cases, chil-

dren of a year old, one ill with diphtheria and the other with pseudo-diphtheria, the hæmoglobin was about 50 per cent. Mercury in small doses has been recommended, but it did not seem to me of service in the few cases in which I have used it, or seen it used. The cases of Behring, treated with the blood serum of immune animals, encourage us to hope that a feasible internal remedy may be found.

At present, local remedies are our best means for the treatment of this disease, and obviously they are best adapted to those cases that are seen early, before much of the poison has been absorbed, and further to cases in which the membrane is accessible.

Given a patient in whose throat is a patch of membrane filled with bacilli that reproduce themselves in a very short period, and which generate a soluble and most virulent poison; a membrane that may be thick and tough, and over the surface of which there constantly passes a stream of saliva that will quickly carry away the remedies applied to it; situated in a region to which applications can be made for short intervals only, and even then is not easy of access. What should we do? It is worse than useless to tear off the membrane; this causes bleeding, the membrane rapidly returns and over a larger area. The bacillus seems, above all things, to delight in the blood serum, and the membrane follows the course of the bleeding as eagerly as a hungry horse will follow oats. Bacteriologists, in searching for a medium in which to tempt the bacillus to grow outside of the body, have found nothing better adapted to the organism than blood serum.

The actual cautery is obviously not a good thing. Chlorate of potash does not seem to me of service, and in excessive doses may do serious harm. Nitrate of silver is a caustic that does not penetrate deeply. Chromic acid is one of the most relentless of all caustics. Iodine is irritating when inhaled, as are the vapors from saturated solutions

of chlorine. Solutions of carbolic acid are poisonous and inefficient as germicides. I have not succeeded with digestives. *Sesqui-chloride of iron*, which is often used in the form of a tincture, has been, and with some still is, a favorite application. Knowing that these iron preparations contained free acid, I thought it probable that the acid rather than the iron would prove to be the active agent. To test this, Mr. A. P. Mathews compared for me a solution of chloride of iron with a solution containing no iron, but the same quantity of acid as there was in the iron solution. The iron solution was found to be no better as a germicide against the bacillus of diphtheria than the acid water, thus showing the acid to be the essential agent in the iron solution. The *tincture* of the chloride of iron contains 2.5 to 3.4 per cent. of free hydrochloric acid; the *solution* of chloride of iron from 5.4 to 7.4 per cent. of free hydrochloric acid. These iron solutions are an excessively unpleasant treatment. *Corrosive sublimate* has much reputation as a germicide, but its action seems to be inhibitory rather than germicidal. I insert here three cases of diphtheria, the diagnosis of which was based on cultures in which corrosive sublimate was used locally, as better treatment was not at the time practicable, and they show how the membrane may persist under its use:

J. B., 12 years old, entered the hospital on the third day of the disease. Membrane was seen on both tonsils, both sides of pharynx, and a small spot one-eighth of an inch in diameter on posterior pharynx. Klebs-Loeffler bacilli found in culture. The local treatment for thirteen days was a solution of 1:10,000 corrosive sublimate in spray every four hours, but in spite of this the membrane continued to cover more area, and to become thicker until the eighth day of the disease, when the throat began to clear. Septic odor. On the tenth day no bacilli were found in

culture; their growth was probably inhibited by the presence of corrosive sublimate. On the sixteenth day, the throat was clear. The heart was noticeably weak in its action, and tincture of digitalis was given. After six weeks, the patient left the hospital for the Convalescent Home. There had been nothing seen in the throat for twenty-six days, and she had been about the ward. She passed three weeks in the Convalescent Home, and then on account of hoarseness returned to the hospital. My service was then at an end, but the records, which I have the privilege of inserting here, state that there was "a piece of membrane adherent to one vocal chord. After eleven weeks, the tonsils were large and covered with a whitish film or membrane which could be wiped off with difficulty; breath foul. Dr. Councilman found Klebs-Loeffler bacilli abundant." The last record of membrane which was on the tonsils was almost twelve weeks after the onset of the disease. The patient was discharged on the one hundredth day of the disease.

This case illustrates the futility of the 1 : 10,000 solution of corrosive sublimate in preventing the spread of the membrane, and the persistence of the bacilli in spite of its use. It would be desirable to have bacteriological examinations made of every throat before the patient is allowed to leave the contagious ward, care being taken not to have corrosive sublimate used at the time the swab is rubbed over the throat, as a very small amount of it will inhibit the growth of the bacilli in the culture tubes.[1]

In the two following cases the attempt was made to get

[1] Since this paper was read a man has come to the hospital with nasopharyngeal paralysis. No membrane was seen in the throat by two physicians who examined him, but Klebs-Loeffler bacilli were found in the cultures. The history of the case showed that the attack of diphtheria had begun about eight weeks previously. This case shows the importance of bacteriological examination before isolation is ended, as well as in the beginning of the disease.

a cleansing action from a weak (7.5-volume[1]) solution of hydrogen peroxide to assist the action of the 1 : 10,000 corrosive sublimate.

In the first of these the patient, a woman 22 years old, had paralysis on the 15th day of the disease, and the throat was not clear until the 17th day of the disease. In the second case, M. McP., a woman 28 years old, entered the hospital on the third day of the disease. Thick membrane on both sides of uvula and on left tonsil. Klebs-Loeffler bacilli found in culture. The local treatment was a spray of 7.5-volume solution of hydrogen peroxide every two hours, followed by a spray of corrosive sublimate 1 : 10,000. On the seventh day of the disease the patient was hoarse, and the membrane had evidently spread to the larynx. Prostration. Reduplication of heart sounds. After ten days a spray of corrosive sublimate 1 to 20,000 was used every four hours. Three days later this was omitted, as the patient was salivated. Seventeenth day; paralysis; thirty-fourth day the throat was clear. The patient was discharged on the forty-first day of the disease.

These cases show that the membrane may not be removed, but may continue to spread under a local treatment of corrosive sublimate 1 to 10,000 (as illustrated by J. B.), and also when this is used in connection with a 7.5-volume solution of hydrogen peroxide, as illustrated by the last two cases.

[1] In the United States a 20-volume solution of hydrogen peroxide has been and still is one which will yield twenty times its volume of oxygen if decomposed by permanganate of potassium; but one-half of this oxygen is contributed by the permanganate as it is likewise decomposed. The hydrogen peroxide (or dioxide) water described in the *U. S. Pharmacopœia* for 1890, which will be official on January 1st, 1894, is a 10-volume solution, and one in which the number of the volumes named denotes the amount of its own available oxygen. This 10-volume solution is, therefore, equivalent to the 20-volume solution described above. I have adopted in this article the pharmacopœial manner of indicating the strength of the hydrogen peroxide solutions, and therefore the 50-volume solution of my paper of 1892 becomes here a 25-volume solution.

It would take too long even to enumerate the various kinds of local treatment that have been used in diphtheria, but there are certain conditions to be fulfilled that will serve as a guide in our selection.

We need an agent that will kill the bacilli quickly, and will not injure the patient by its harmful or poisonous attributes. The first step in an investigation of this kind is to ascertain what will kill the organism in the laboratory, although it does not follow that the same result will be obtained in the throat. In the experiments made for me in the Biological Laboratory of the Massachusetts Institute of Technology with various germicides on the bacillus of diphtheria, I chose the short period of ten seconds during which they were allowed to exert their action, as the contact of the germicide with the membrane in the throat must necessarily be short.

The results of a few of the experiments were as follows: A saturated solution of carbolic acid did not kill the bacilli in ten seconds. A solution of hydrogen peroxide, of between 12 and 25 volumes, containing $\frac{1}{4}$ to $\frac{1}{2}$ per cent. of acid respectively, killed the bacilli in ten seconds, but it took over a 50-volume nearly neutral solution of hydrogen peroxide to do the same work.

The ordinary hydrogen peroxide solutions offered for sale have a strength of 7.5 or 10 volumes, or much less—some of these are neutral, others acid.[1] These weak solutions, whether neutral or acid, are not active germicides, judged by their effect upon the bacillus of diphtheria, an organism which is not so difficult to kill as the staphylococcus, for instance, but the neutral solutions have far less germicidal power than the acid ones. I pointed out by some observa-

[1] It is interesting to note the importance of the mineral acids, especially hydrochloric acid; they are of value in the hydrogen peroxide solutions, and are good germicides when used alone; hydrochloric acid is, as we have seen, the active agent in the iron solutions, and is also a valuable germicide in the gastric juice.

tions published last year[1] the distinction that should be drawn between the nearly neutral and the acid solutions, but it is evident that this point needs further emphasis, particularly as the solutions of the hydrogen peroxide are coming more into use and neutral ones are made which are excellent for certain purposes, but which, being nearly free from acids, have little germicidal value against the bacillus of diphtheria, *except in unusual strength.*

The strong hydrogen peroxide acid solutions, by which I mean strengths of 25 to 50 volumes or more, as already shown, are efficient germicides in the laboratory, and they have besides the special quality of breaking up and disintegrating certain portions of the diphtheritic membrane, without injury to the healthy tissues, thus rendering the bacilli more accessible.

Having found a substance that has no poisonous properties, namely, a strong solution of hydrogen peroxide, that is shown to be an efficient germicide in the laboratory, let us see what it will do clinically. I was so situated that in most of the cases in which the diagnosis was carefully made by cultures, the strong hydrogen peroxide solutions were not used, and in most of the cases in which the peroxide treatment was used, the cultures were not made. I have made some use, chiefly in 1892, of strong peroxide solutions, in 74 cases in all; 16 of these died and 58 recovered; but, as in most of these cases the diagnosis was not based on cultures, it is impossible to state exactly how many were diphtheria and how many pseudo-diphtheria. In the 16 cases that died the patients entered the hospital after they had been ill an average of five days, so far as I could learn. Eight of these died within one to three days after entrance. There was not much opportunity for treatment, and the hydrogen peroxide was omitted when the patients seemed too weak; two entered the hospital on the

[1] Boston Medical and Surgical Journal, September 29, 1892.

last day of my service, and the strong solutions of hydrogen peroxide were employed on that day only. These patients died about two and four weeks later respectively. In four cases the membrane was in or extended to inaccessible parts of the throat, and in but one of these was there temporary improvement. In the 15th case the patient had diphtheria (as shown by subsequent paralysis) and scarlet fever simultaneously. There was local improvement, but the child died about the 15th day of the disease. In the 16th case scarlet fever developed on the 12th day of the disease, when the throat was nearly clear. The patient did well until the 15th day, then had suppurating glands and died on the 19th day of the disease.

In the four following cases, the diagnosis of which was based on cultures, the strong hydrogen peroxide solutions were used. The first two are cases of *pseudo*-diphtheria.

E. F., aged 20 years, entered the hospital on the second day of the disease. Thin gray membrane on the left tonsil, and all along the arch of soft palate. Mr. Mathews found streptococci on cover-glass and in culture, but no bacilli. The membrane was cleared off completely with 50-volume solution of hydrogen peroxide applied with a swab, and this was followed by an application of chlorinated soda. Spray of 25-volume hydrogen peroxide solution every four hours. On the fifth day of the disease, but the third after treatment, the throat was clear. Recovery.

C. D., aged 23 years, consulted me on account of some slight difficulty, and, as a matter of routine, I looked in her throat which was then clear. On the following day, I was much surprised to be sent for in some haste, and then found on both anterior pillars, tonsils and uvula, patches of membrane which were $\frac{1}{16}$ of an inch thick, and could be removed with some difficulty with the edge of a teaspoon, but this caused bleeding. I removed most of the membrane with a

25-volume hydrogen peroxide solution, but left the base of one patch on the soft palate about ¼ of an inch in diameter, fearing that further attempts to remove it might set up bleeding, as here the mucous membrane looked as if the surface had been etched off. As this patch was at a point readily accessible to a gargle, I left the patient at 1 P. M. with directions to use a dilute acid solution of hydrogen peroxide every half hour, and to follow this by a gargle of a diluted solution of chlorinated soda. At my second visit, three and one half hours later, I was much gratified to find the throat entirely clear of membrane. I saw the patient daily for some days, during which mild antiseptic sprays and gargles were used, but there was no return of the membrane. This was seen only at my first visit. No Klebs-Loeffler bacilli were found in cover-glass examination. Cultures showed streptococci and staphylococci. We may look for better results in private practice than at the hospital, as in the former case patients are generally seen earlier.

In the two following cases of diphtheria, the diagnosis of which was based on cultures, there was partial use only of strong solutions of hydrogen peroxide, but even by this good results were accomplished.

A. B., aged 24 years, entered the hospital on the second day of the disease. 4 P. M., membrane on right tonsil thick in places, cartilaginous in character. Membrane also on left tonsil and left wall of pharynx. Klebs-Loeffler bacilli found on cover-glass and in culture. Strong hydrogen peroxide acid solution, 25-volumes, was applied in spray, and 50-volumes by syringe and swab, and the membrane removed, except in points around anterior edge of left tonsil, which were cartilaginous in character. The patient said there was less pain in swallowing a few minutes after the application of the peroxide than before, and after this application he ate his evening meal of eggs on toast, etc.

At 9 P. M. the membrane had returned to some extent over area of 4 P. M., but was not so thick and had not spread. Strong hydrogen peroxide again applied. Spray of corrosive sublimate 1 : 10,000 given every two hours through the night. Large dose of bromide at night to prevent serious loss of sleep from frequent waking. The patient slept ten hours. No hydrogen peroxide solution was applied during the night, and the next morning the membrane was found to have spread rapidly over both sides and on to the back of pharynx in spite of the 1 : 10,000 corrosive sublimate that had been applied every two hours. There seemed to be some membrane in naso-pharynx. Strong hydrogen peroxide acid solution 25 and 50 volumes was then applied to the throat on a swab. A solution of chlorinated soda, 1 : 6, was applied every two hours in spray. At 8 P. M., large dose of bromide. On fourth day of the disease, membrane over same area as on the third day. 25 and 50 volumes hydrogen peroxide applied morning and afternoon, followed by chlorinated soda. The membrane seemed to be kept from spreading or becoming thick if the applications of hydrogen peroxide were made every four hours, but otherwise it gained in thickness and somewhat in extent. Fifth day of the disease, general condition excellent. Membrane much less in extent and thinner. Hydrogen peroxide only twice during the day. Membrane seemed under control. Sixth day; the patient had eaten well before, but now had appetite. General condition excellent. Throat clearing. Two applications of hydrogen peroxide, although this seemed hardly necessary, but it was done to prevent the possibility of relapse. Two per cent. spray of cocaine applied to throat prevented pain from the application of the peroxide. On the seventh day of the disease, and the fifth after entrance, a final application of peroxide was made. The patient left the contagious ward six days later. There was no cardiac weakness, no depression and no paralysis.

M. L., aged 18 years, entered the hospital February 25, on the second day of the disease. His throat had the appearance of a follicular tonsillitis. On my first visit I found the Klebs-Loeffler bacilli, micrococci and streptococci in a cover-glass examination. The next day Dr. Councilman obtained an almost pure culture of Klebs-Loeffler bacilli. At 1 P.M. there were two small patches of membrane on the right tonsil, the one an eighth by a quarter of an inch and the other an eighth of an inch in diameter. These were removed with six minims of a 25-volume hydrogen peroxide solution in syringe, and this was followed by an application of chlorinated soda. At 5 P.M. the throat was again cleared carefully with 25-volume hydrogen peroxide solution by swab and syringe, followed by an application of strong chlorinated soda on swab. At 9.30 P.M., the membrane was not visible, except a thin, yellowish, translucent deposit over orginal area, namely, on right and left tonsil. This was cleared off with the hydrogen peroxide solution, and was followed by chlorinated soda solution. No hydrogen peroxide was used through the night, but a solution of chlorinated soda was applied every two hours. In spite of this, on the following morning the membrane had spread over the larger part of the right tonsil, and there was also a strip of membrane three-quarters by an eighth of an inch on each side of the pharyngeal wall. This was cleared off again with 25-volume hydrogen peroxide solution on swab at 10.30 A.M., and again at 5.10 P.M. On the 4th day of the disease, only two applications of the peroxide were made, as the membrane was readily controlled, and on the 5th day one final application of the peroxide was made. On the 6th day of the disease, and fourth after entrance, the throat was clear. Patient felt well and asked if he might get up. Discharged after being kept under observation 10 days longer. There was no cardiac weakness, no depression and no paralysis.

In these two cases a strong peroxide solution was used only two or three times in the twenty-four hours, and the membrane returned during the long intervals of several hours when it was not applied, in spite of the use of corrosive sublimate or chlorinated soda every two hours. These cases had only a partial peroxide treatment. In both instances the condition of the patient was excellent throughout the illness. These two cases suggest that by early local treatment with peroxide we may diminish the generation and absorption of poison from the bacilli.

I have found nothing that will remove the membrane so well as the strong solutions of hydrogen peroxide.[1]

The drawbacks of the strong solutions of hydrogen peroxide consist, *first*, in the fact that the acid solutions, which are stronger germicides, cause pain, due to the acid, which lasts about one minute. Some patients object to this very much; others, including children, will permit the use of 50-volume solution with little fuss. In private practice, I recall a young lady who applied the 50-volume solution to her own throat on a swab, and used it more frequently than I had directed. On another occasion I suggested in consultation that cocaine be first applied to the throat, but the physician in attendance said it was unnecessary, as the patient, a child three and one-half years old, did not mind the 50-volume solution which he had been using in spray. The discomfort is due to the acids rather than the hydrogen peroxide; if the solutions are neutralized the discomfort is largely obviated. We may disguise the acid by

[1] I give some details concerning the strong hydrogen peroxide solutions, as they are a novelty. Physicians and chemists told me that even 25-volume solutions were impracticable or impossible, but as the caution came after I had had a 100-volume solution, I was not dismayed.

Unlike chlorine and chlorinated soda, corrosive sublimate, if desired, may be mixed with hydrogen peroxide; citric or tartaric acid should be added to prevent the precipitation of the albuminate of mercury in the throat.

It gives me pleasure to again express my indebtedness to Professor H. P. Talbot, of the Massachusetts Institute of Technology, for his assistance in the study of hydrogen peroxide.

adding sugar, as in lemonade, showing that it is the acid taste that is disagreeable rather more than the so-called irritation. Instead of adding sugar we may apply cocaine to the throat before we use the hydrogen peroxide solution. The amount of acid in the 25-volume solution which I used was ½%, in the 50-volume 1%. This is far less than the amount of acid in the chloride of iron solutions; for, as already stated, the *tincture* contains from 2.5% to 3.4% of hydrochloric acid; and the *solution* of the chloride of iron from 5.4% to 7.4% of hydrochloric acid.

Second. Strong solutions of hydrogen peroxide[1] have not been easily procured, nor do they bear transportation well, but these inconveniences may be readily surmounted. The apothecary or the physician has merely to evaporate a 10-volume solution in a shallow open dish, over a water-bath, or on a range or stove, to obtain a solution either of about 25 or 50 volumes.[2] The initial solution should not be too acid; the dish should not be of metal and should be free from organic matter.

[1] The stability of the strong solutions and the precautions to be used for keeping them, I have already described in a former article. As soon as their properties are more widely known, and it is appreciated that they may be obtained without much difficulty, they will, I believe, find other uses than that of a local application in diphtheria. They should not, of course, be employed in closed cavities, as the oxygen liberated might cause pressure.

[2] To be more precise, a 25 or 50-volume solution may be obtained by evaporating a 10-volume solution to one-third or one-sixth of its bulk respectively. The loss of the hydrogen peroxide is usually less than 10 per cent. in the former case and about 20 per cent. in the latter. The temperature being the same, the loss seems to be less when the hydrogen peroxide is evaporated quickly than when the process is carried on more slowly. One teaspoonful of a 50-volume solution is ample with which to begin treatment. The strong solutions should be kept in a cool place except when in use.

By evaporating 200 c.c. of a 11.5-volume solution I have obtained a 275-volume solution. A drop of this applied to my tongue caused momentary smarting.

A 10-volume solution of hydrogen peroxide may be tested in the following way. One drachm of it diluted with about an ounce of water and acidified with about three drachms of dilute sulphuric acid will dissolve and decompose three grains of permanganate of potassium (in crystals) and leave a colorless solution. If the strength is less than 10 volumes the solution will finally be of a bright red color.

Third. Hydrogen peroxide is a bleaching agent, and should not be brought into contact with the hair or colored fabrics, but it does not injure white linen or cotton. One should avoid getting it on the fingers, as it may, after a few minutes, whiten a thickened epidermis and cause a sensation of pricking.

The advantages of the strong hydrogen peroxide solutions are that they are good germicides, and are not poisonous or harmful to the mucous membrane; they cleanse a foul throat and break up and disintegrate certain portions of the diphtheritic membrane, thus rendering the bacilli more accessible; they likewise assist in diagnosis, for when the hydrogen peroxide, even in weak solution, is applied to the throat where there is any trace of membrane, it causes it to assume a white color from the presence of fine foam which is made by the liberation of the oxygen gas. It thus becomes a useful agent in detecting spots of membrane earlier than they would be apparent in any other way, and thus indicates the areas to which the treatment should be directed. With this end in view, the throat may be sprayed or the mucous membrane may be swabbed with dilute hydrogen peroxide. It is known that corrosive sublimate, to a considerable extent, is inhibitory rather than germicidal in its action, but it would be difficult to conceive of a merely inhibitory action on the part of hydrogen peroxide, as this substance is so readily decomposed.

No rule can be given for applying these solutions that will cover all cases; in a general way it may be said that the strong solutions of hydrogen peroxide, containing about ½ per cent. of acid, made up chiefly of hydrochloric and sulphuric acids, should be gently but thoroughly applied, every four hours during the night and more frequently during the day, for the first few days. The 25-volume solution may be used in spray; the 50-volume may be applied a drop or two at a time with the swab until the

membrane is removed or much diminished, or in certain cases the 50-volume solution may be applied with the syringe. Even a stronger solution than 50-volumes may be used for resistant membranes. It is well to use cocaine before applying the peroxide. By the help of bromide at night, the patient loses very little sleep in being aroused for the local treatment. Every precaution should be taken to spare the patient's strength, and it is not necessary that the head should be raised from the pillow while the applications are made.

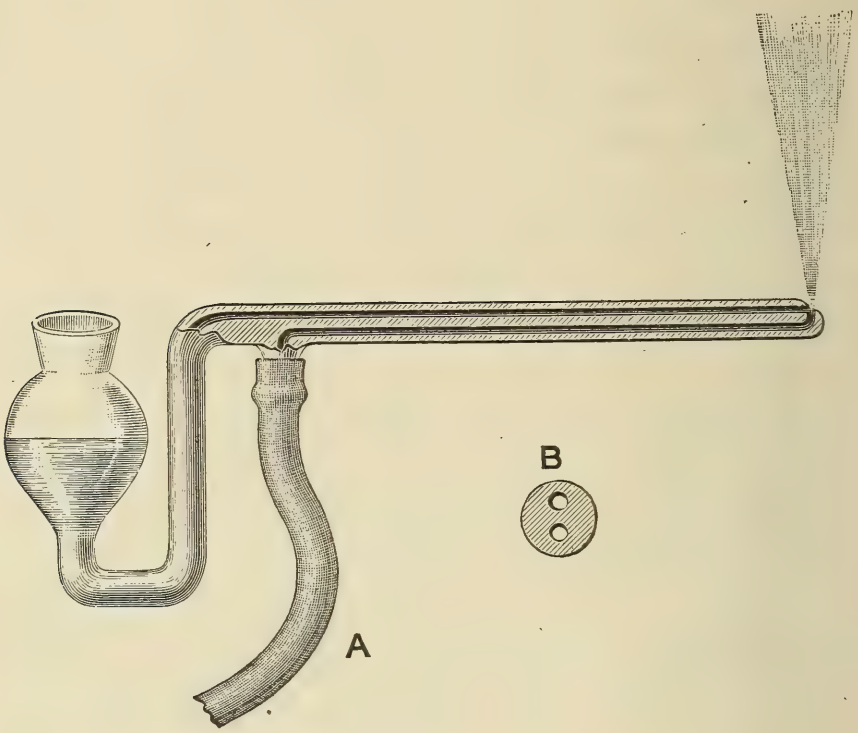


Fig. 1.

A is a rubber tubing to hand bulb. The cut is one-half size except the section of the tube at B, which is full size. The bulb in the drawing should have more the shape of a top, and when of such shape it can be placed on its side without losing any of its contents if it is not more than half full. If the tubing A which joins the rubber hand bulb to the atomizer is only about one inch long the atomizer can be worked with one hand. It will be noticed that the straight tube of the atomizer is unusually long—more than four inches from the rubber tubing to the tip.

These instruments are made by P. J. McElroy, East Cambridge, Mass., U. S. A., who manufactures various forms of glass atomizers out of this double-bored glass tubing of his invention.

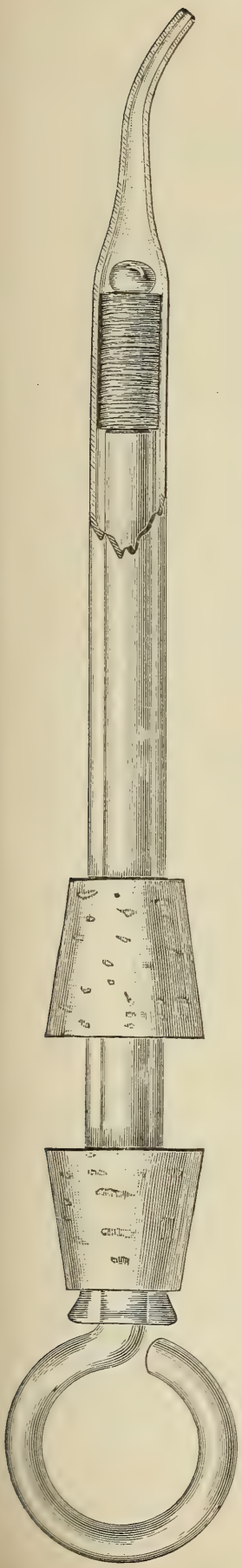


Fig. 2. The syringe is of glass, one inch longer than the drawing, otherwise this is the full size. The walls of the syringe beyond the piston are thick, and the tip is smooth, having been rounded in a flame. The form is such that it can reach any part of the throat within sight. The corks are now replaced by glass projections. The packing may be of cotton or asbestos. The cost of the syringe is trifling.

As we know that the bacilli are not limited to the diphtheritic membrane, antiseptics should be brought into contact with other portions of the throat and nose than those covered with membrane, by such means as sprays and gargles, as a prophylactic measure.

The accompanying cuts show the instruments which I have designed for making applications to the throat, but any good atomizer, not of metal, that will reach the desired spot conveniently, or a swab made by twisting a small piece of absorbent cotton about the end of a small stick, may be used.

By means of this atomizer (Fig. 1) the spray may be sent in three directions, up and right and left, in the throat without taking it out of the mouth, but merely by turning it in the hand.

The tip of the syringe (Fig. 2) may be pushed through the false membrane, and a drop or two of solution pressed out; the oxygen then generated underneath a *thick* membrane will lift off large pieces of it. In this way large numbers of bacilli are removed, the poison from which might otherwise be swallowed and absorbed.

The swab used to apply the solution (Fig. 3) consists of a small glass

tube, drawn out at one end into a smaller rod about which sufficient absorbent cotton has been twisted to hold two or three drops of liquid. The end of the rod has been rounded

Fig. 3.

The swab is 8 inches long, but otherwise the drawing is full size.

in a flame and made slightly bulbous, as shown by the dotted line; by this device the cotton is held firmly.

The sterilized swab and its holder, 7 inches long, which I used for taking specimens from the throat, are shown in the wood-cut (Fig. 4), which is about one-half size. After

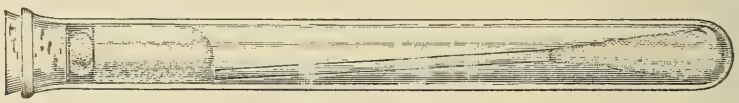


Fig. 4.

the swab has been rubbed over the throat it is replaced in the tube of thick glass which is stopped with sterilized cotton. A small piece of this having been previously torn off, is moistened with a few drops of water and placed above the stopper to prevent the specimen from drying. The tube is then closed with a cork to prevent evaporation. There should be no delay in taking a swab, and the treatment should then be applied without waiting for the result of the cultures.

I have found it difficult to obtain some common germicides, not only hydrogen peroxide, of the strength which they purport to be. This leads me to emphasize the need of caution concerning the quality of the remedies we employ. Physicians may well take a lesson in therapeutics from the surgeons, for in antiseptic surgery, which is largely therapeutics, they set us an example of painstaking care in the use of remedies that we should do well

to follow. If in surgery, where the conditions are comparatively simple, so much pains must be taken, how much more careful should we be when the problem is more complex. When in the selection and application of our remedies we approach the standard antiseptic surgery has set for us, we shall hear less about the inefficacy of drugs.

Diphtheria usually begins on the tonsils, and to avoid serious consequences, for instance those resulting from the spread of the membrane to the neighboring air passages, no moment should be lost before beginning the treatment. Until we have found something that will find and kill all the bacilli at a single blow, any local treatment must be frequently applied to be efficient, as the bacilli reproduce themselves in a very short period. From these frequent applications during the early days of the disease I see, at present, no appeal. The use of the strong hydrogen peroxide solutions reduces the number of applications to a minimum, as the more thoroughly the membrane is disintegrated and removed the less frequent is the necessity for treatment and the shorter its duration.

In those cases that are first seen several days after the onset of the disease, and when the patient has become weakened by the poison generated by the bacilli, we must weigh carefully the loss of strength resulting from frequent applications, especially in very young children, against the gain to be derived from the removal or destruction of the bacilli. Further, if the patients have been ill some days when first seen, the chances of recovery are much diminished, and in some cases no treatment as yet at our command is of avail; just when the physician should renounce all hope of aid from local treatment, each one must, of course, decide for himself in the individual case. The usefulness of good local treatment is in direct ratio to the stage of the disease, the accessibility of the membrane, the age and strength of the patient, and the ability of the practitioner to apply it

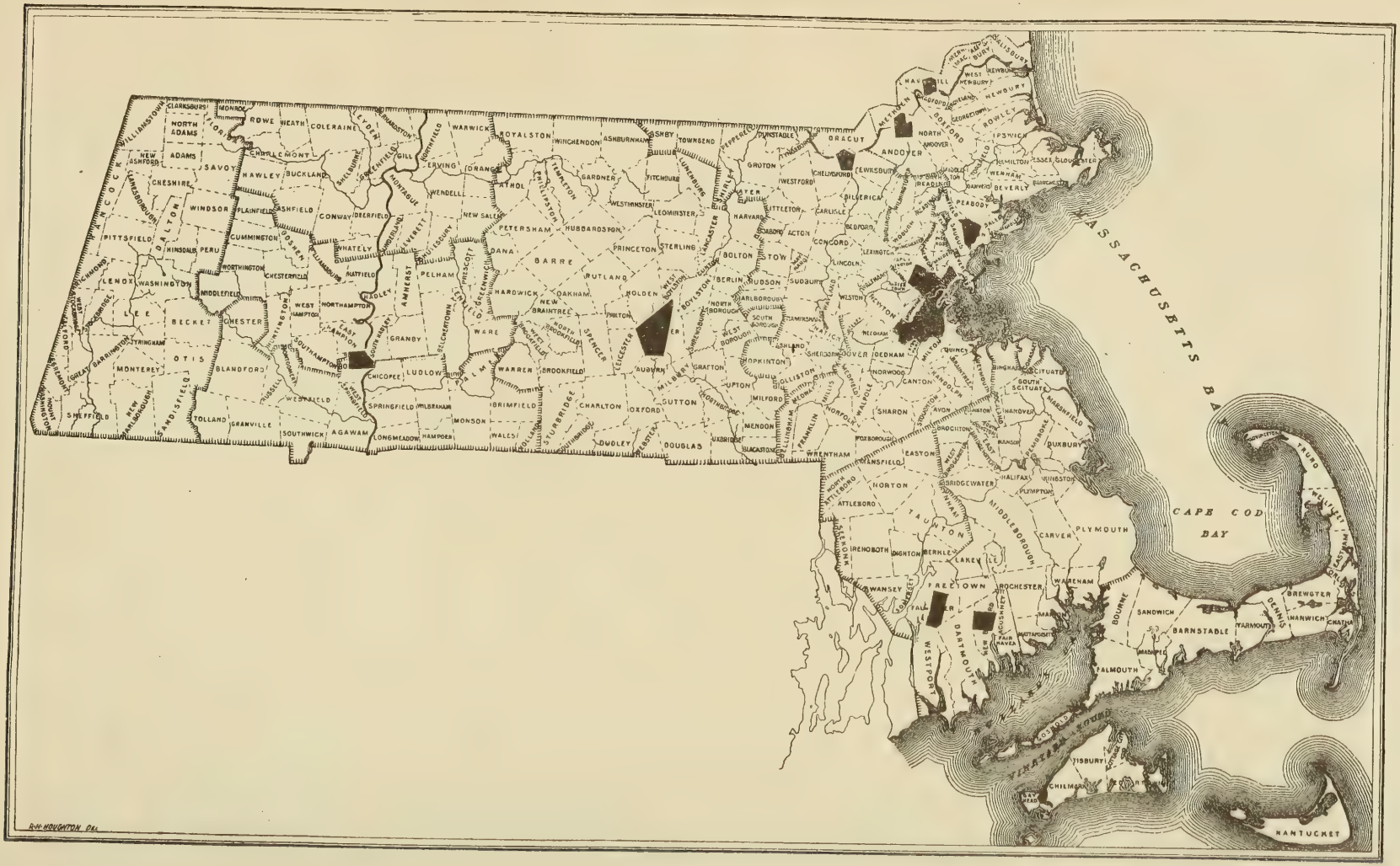
with the least tax on the patient's strength, combined with the greatest destruction of the bacilli.

I beg you not to go away from here with the impression that diphtheria can always be cured by strong hydrogen peroxide solutions. I maintain only that when properly used they are more efficient and less harmful than any other treatment I know of. Under their use, all of the few cases that I have thus far seen early in the disease, recovered.

As already stated in the opening of this paper, there were 36,553 deaths from diphtheria and croup in Massachusetts from 1871–1890, inclusive. Rather more than one-half of these, 19,310, occurred within a very limited area; that is, within the area of the twelve cities, or those fractions of them represented by the nine[1] black spots on the accompanying map. During these twenty years about 43 per cent. of the population was to be found in these cities, and 53 per cent. of the deaths from diphtheria and croup during this time occurred in them. Further, it is of interest to note that the greater part of these deaths occurred during four months of the year, namely, from October to January inclusive. These are suggestive facts when considered from the standpoint of prevention. It is highly important for each city and large town to have a suitable hospital for contagious diseases, and also to offer facilities for bacteriological examination in those diseases in which false membranes develop. In smaller communities it would seem desirable to extemporize a hospital during an epidemic.

Diphtheria seems to me to be chiefly a hand to mouth or mouth to mouth disease; its cause is tenacious of life, especially in damp places, and is not killed by cold, but is killed by sunlight. The period of incubation, after the bacilli have reached the mucous membrane, is probably, in some cases, not days but hours only. With the

[1] Four cities, Boston, Cambridge, Chelsea and Somerville, are contiguous.


CLARKSBURG
WILLIAMSTOWN
MONROE
NORTH ADAMS
ADAMS
ROWE
HEATH
COLERAINE
LEYDEN
BERNARDSTON
FLORIDA
NEW ASHFORD
CHARLEMONT
SAVOY
HAWLEY
BUCKLAND
SHELBURNE
GREENFIELD
GILL
ERVING
WARWICK
ROYALSTON
WINCHENDON
ASHBURNHAM
ASHBY
TOWNSEND
PEPPERELL
DUNSTABLE
GROTON
GRACUT
ANDOVER
NORTH ANDOVER
METHUEN
HAVERHILL
WEST NEWBURY
NEWBURY
BOXFORD
GEORGETOWN
ROWLEY
IPSWICH
HAMILTON
ESSEX
GLOUCESTER
BERKSHIRE
CHESHIRE
WINDSOR
PLAINFIELD
ASHFIELD
CONWAY
DEERFIELD
MONTAGUE
WENDELL
ORANGE
ATHOL
PHILLIPSTON
TEMPLETON
GARDNER
WESTMINSTER
LEOMINSTER
FITCHBURG
LUNENBURG
SHIRLEY
HARVARD
LITTLETON
CARLISLE
BILLERICA
CHELMSFORD
TEWKSBURY
WILMINGTON
READING
WOBURN
WINCHESTER
MEDFORD
MALDEN
REVERE
SALEM
BEVERLY
WENHAM
MANCHESTER
DANVERS
PEABODY
LYNN
PITTSFIELD
DALTON
HINSDALE
PERU
CUMMINGTON
WORTHINGTON
CHESTERFIELD
WILLIAMSBURG
GOSHEN
WHATELY
HATFIELD
SOUTH HADLEY
AMHERST
LEVERETT
LEVERETT
LESLEY
NEW SALEM
PETERSHAM
HUBBARDSTON
DANA
BARRE
PRINCETON
STERLING
LANCASTER
BOLTON
HARVARD
ACTON
CONCORD
LEXINGTON
LINCOLN
WAYLAND
SUDBURY
WESTON
NEWTON
BROOKLINE
CAMBRIDGE
LENOX
WASHINGTON
MIDDLEFIELD
PELHAM
RUTLAND
BERLIN
HUDSON
MARLBOROUGH
NORTH BOROUGH
SOUTH BOROUGH
WEST BOROUGH
BOSTON
DEDHAM
MILTON
QUINCY
BRAINTREE
HOLDEN
WEST BOYLSTON
BOYLSTON
NORTH BROOKFIELD
NEW BRAINTREE
OAKHAM
HARDWICK
PALMER
WARE
GRANBY
SOUTH HADLEY
EAST HAMPTON
NORTHAMPTON
WEST HAMPTON
LEE
BECKET
CHESTER
HUNTINGTON
SOUTHAMPTON
WESTFIELD
RUSSELL
BLANDFORD
MONTEREY
OTIS
SANDISFIELD
GREAT BARRINGTON
STOCKBRIDGE
LANESBOROUGH
HANCOCK
SHEFFIELD
NEW MARLBOROUGH
TOLLAND
GRANVILLE
SOUTHWICK
AGAWAM
CHICOPEE
SPRINGFIELD
WILBRAHAM
LONGMEADOW
HAMPDEN
LUDLOW
WARREN
BROOKFIELD
LEICESTER
AUBURN
GRAFTON
MILBURY
SUTTON
OXFORD
CHARLTON
BRIMFIELD
MONSON
WALES
STURBRIDGE
DUDLEY
DOUGLAS
SOUTH BRIMFIELD
HOLLAND
BROOKFIELD
SPENCER
WORCESTER
SHREWSBURY
WESTBOROUGH
NORTHBOROUGH
HOPKINTON
ASHLAND
SHERBORN
NEEDHAM
DOVER
NORWOOD
CANTON
MILFORD
HOPEDALE
MENDON
UXBRIDGE
BLACKSTONE
MILLVILLE
BELLINGHAM
FRANKLIN
WRENTHAM
NORFOLK
WALPOLE
FOXBOROUGH
SHARON
STOUGHTON
AVON
RANDOLPH
BRAINTREE
HOLBROOK
WEYMOUTH
HINGHAM
SCITUATE
SOUTH SCITUATE
MARSHFIELD
HANOVER
HANSON
DUXBURY
EASTON
NORTH EASTON
BRIDGEWATER
HALIFAX
PLYMPTON
KINGSTON
ATTLEBORO
NORTH ATTLEBORO
TAUNTON
RAYNHAM
MIDDLEBOROUGH
HORTON
CARVER
PLYMOUTH
IRENOBOTH
BERKLEY
LAKEVILLE
FREETOWN
ROCHESTER
WAREHAM
SWANSEY
DARTMOUTH
WESTPORT
FALL RIVER
NEW BEDFORD
ACUSHNET
FAIR HAVEN
MATTAPOISETT
MARION
BOURNE
SANDWICH
BREWSTER
DENNIS
HARWICH
CHATHAM
BARNSTABLE
YARMOUTH
FALMOUTH
MASHPEE
VINEYARD SOUND
HOLMES HOLE
TISBURY
CHILMARK
GAY HEAD
GAY HEAD
NANTUCKET
MASSACHUSETTS BAY
CAPE COD BAY
TRURO
WELLFLEET
EASTHAM
ORLEANS
R.H. HOUGHTON, DEL.

improved means of diagnosis at our command, by isolation and the coöperation of intelligent citizens with the Boards of Health, it may become one of the most preventable of diseases, and I hope that before many years have elapsed we shall see diphtheria considerably diminished in our State, as well as elsewhere. The members of this society can do much to further this end. The best defence against this disease is educated public opinion.

SUMMARY.

1. The necessity of cultures as a means of early diagnosis.
2. The coincidence of diphtheria and other diseases.
3. The bacteriological examination of all patients ill with scarlet fever, typhoid fever, measles or other disease, who have membranous throats.
4. The bacteriological examination of specimens from the throats of all diphtheria patients before isolation is ended.
5. Seven and one half [known at present in the United States as fifteen] volume solutions of hydrogen peroxide are weak germicides.
6. The advantages of strong hydrogen peroxide solutions, locally in diphtheria. The substitution of harmless and more efficient for harmful or inefficient local treatment.
7. The importance of frequent, early, local applications.

NOTE.—Dr. John F. Young, of Newburyport, was present when this paper was read, and ten days later had a case of diphtheria in which he used the strong hydrogen peroxide solutions. I heard of it by chance, some weeks afterwards, as the patient was the child of an acquaintance. In reply to my inquiries Dr. Young kindly wrote me about the case. With his permission I quote his letter almost in full.

"My patient was a bright and sensible girl of ten years; on the morning of the 24th of June she complained of headache and sore throat. I saw her for the first time about 4 o'clock that afternoon. There was some stiffness of the neck and some swelling on each side at angle of the jaw. The tonsils and arches of the palate were red and swollen. There was considerable fever, and also a good deal of dizziness when the patient sat up in bed. Small dose of calomel, as the bowels were somewhat confined, and boric acid gargle.

"Saw her next morning, 25th, about ten o'clock, when tonsils and arches of palate nearly up to uvula were covered with a thick grayish exudation, the cervical glands were more swollen, and more constitutional disturbance was present than on first visit. Treatment with peroxide of hydrogen was now begun, after evaporating the solution to one-quarter its original bulk; and, as patient complained of no very disagreeable sensation from its use, it was ordered to be applied in form of spray every hour. Saw the patient again about 7 P. M. There had been no extension of exudation. No other change noticed, except that exudation looked thicker and more swollen. Directed that spray be used every 2 to 3 hours through night.

"On the morning of the 26th no considerable change in appearance of throat; no extension, but patient had decidedly less trouble (dizziness) on sitting up, and expressed herself as feeling better. Evening about the same.

"27th, A.M. Patches on tonsils and palatine arches appeared to be more loosely attached, and also thicker than before. A patch of exudation (rather thin) about the size of a finger nail was seen opposite the last inferior molar on right side, and another on the front of soft palate near roof of mouth on left side. The peroxide was now applied by means of a swab and repeated again towards evening by myself, the spray being used as before by the nurse. Dur-

ing the evening on swabbing the exudation in the mouth it seemed to melt away, leaving raw and bleeding surfaces, and the original patches to diminish in size considerably, and on the morning of the 28th came off almost at the first touch of the swab. The surfaces left bare were raw and bleeding, and a spray of carbolic acid and lime water was now substituted for peroxide, and used every hour. No reappearance of patches at the evening visit.

"29th, A. M. White patches again covered tonsils and arches of palate, not so thick, however, as before, and were removed entirely by two swabbings with peroxide on same day and did not again return. Spray of carbolic acid and lime water was continued for the next two days, when one of boric acid was substituted for it.

"By the 4th of July the throat was looking almost well. At this time a slight nasal intonation was noticed, and after this there was some tendency to regurgitation of liquids through the nose. (This became more marked later.)

"It seemed to me that the peroxide had a decidedly beneficial effect, the constitutional symptoms growing less and less every hour from the very start. The general treatment of the patient consisted in the administration of iron, brandy and milk every three hours, and meat juice midway between feedings of milk and brandy."

The noteworthy points in this case are, first, the effect of the local treatment by strong hydrogen peroxide solutions on the patient's general condition; second, the disappearance of the membrane under the use of this application; its reappearance when carbolic acid and lime water were substituted, and its final disappearance when the strong hydrogen peroxide was resumed.

I wish to express my appreciation of the courtesy and kindness that have been extended to me in the chemical and biological laboratories of the Massachusetts Institute of

Technology, by Professor T. M. Drown and Professor William T. Sedgwick, while I was carrying on some of the investigations connected with this paper.

DISCUSSION.

The Pathological Anatomy.

By WILLIAM T. COUNCILMAN, M.D., of Boston.

As Dr. Williams has fully considered the clinical side, I shall describe the pathological anatomy of diphtheria and other pseudo-membranous inflammations of the throat, and describe the methods used at the Boston City Hospital in distinguishing between the various diseases in which pseudo-membranous inflammations of the throat appear.

The first description of diphtheria was given by Bretonneau. He described as the special anatomical feature of the disease a pseudo-membrane in the pharynx which often extended to the air passages. Trousseau found this description too narrow, and regarded the localization of the disease as of secondary importance. He was the first to recognize its infectious nature, and says that the disease is produced by a specific, definite virus, and death is the result of the poisoning of the system with this virus. Whatever are the local manifestations of the disease, whatever its general form, according to Trousseau, diphtheria is always a definite infectious disease, and one case always arises from a similar case. At the time when Trousseau wrote, in 1860, the disease was less prevalent than at a later period, and appeared in the form of circumscribed epidemics, and sometimes a definite house disease. Under these circumstances he was able to trace the infection very easily, and its infectiousness appeared to him as the chief and most striking feature of the disease. It afterwards became much more difficult to trace the infection in many cases, because since 1860 the disease has gradually become a pan-demic extending over all Europe and America.

With the importance which was given the disease from its gradual and great increase, its clinical features received more attention. The pseudo-membrane which was described by Bretonneau became regarded as its characteristic feature. In consequence of this, all manner of inflammations of the pharynx in which a pseudo-membrane was present, were regarded as diphtheritic. It was not long, however, before the pendulum began to swing in the other direction. The histology and the histogenesis of the pathological process connected with the formation of the membrane were closely investigated, and it was found that a fibrinous exudation, taking the form of a membrane which could not be distinguished anatomically from true diphtheria, might be produced in a number of ways. It might, for instance, follow wounds and traumas of the pharynx, and in the air passages it could easily be produced by various irritants, as by the inhalation of the vapor of ammonia. I once saw the most intense inflammation of the larynx, trachea and air passages, with the production of a false membrane extending into the small bronchi, which followed the accidental inhalation of croton oil which had been placed on the back of the tongue. The patient had been brought into the hospital unconscious in a stage of uræmic coma. A few drops of croton oil were placed on the back of the tongue, and the patient at that moment made an inhalation and a portion of the croton oil entered into the air passages. We see the same sort of inflammation produced in other mucous membranes by various irritants. It may be produced in the rectum by the application of ammonia, and in the intestinal canal generally, but particularly in the large intestine it may be produced in various inflammations due to different bacteria. Not only is the pseudo-membrane found in the throat in cases of diphtheria, but it may appear there in other infectious diseases, particularly in scarlet fever.

Before the era of bacteriological investigations there was no way of absolutely distinguishing those cases in which the membrane was the result of an inflammation which might be produced by various causes, from those in which it represented the local lesions of a specific infectious disease. It can easily be seen that this would result in the greatest

clinical confusion. One clinician would report a long series of cases which he regarded as diphtheria, in which an improved method of treatment brought out by himself was successful in all cases; whereas another would report an almost unbroken series of deaths from the disease. Some cases under any form of treatment ran a mild course, whereas other cases would be followed by death. In the same way infection of other individuals would follow in certain cases, and from a single case an extensive epidemic might arise. Other cases, in which anatomically the same lesions were found, would not be followed by a further infection. Various methods of distinguishing clinically between diphtheria and other infections with similar anatomical lesions were attempted. Some regarded the greater extent of the pseudo-membranous deposit, and its extensions from the tonsils to the palate and the air passages, as the distinguishing feature of diphtheria. Many regarded only those cases as true diphtheria in which paralysis was observed after recovery.

In diphtheria, as in many other diseases, perfect clearness in diagnosis only arose after the discovery of the ætiological factor. We know now that diphtheria is always associated with the presence of micro-organisms characterized by definite morphological, structural and biological characters. The clinician gladly accepted this method of differentiation, because the attempt to define diphtheria according to its clinical features was so completely shattered. We regard now those pseudo-membranous inflammations as belonging to diphtheria in which the Klebs-Lœffler bacillus is found. When that is not present, no matter what the extent and the character of the local lesions, no matter what the severity of the symptoms, the disease is not diphtheria. The Klebs-Lœffler bacillus is a small organism not much larger than the tubercle bacillus. Its most striking feature morphologically is its variation in form and its irregularity in staining. The ends of the organism are frequently clubbed, sometimes one and sometimes both ends, and in most cases when stained it shows a series of clear spaces along with intensely stained particles. The form and size vary greatly under various circumstances. In different cases it appears in some much larger and more irregular than in others, and in the same preparation great irregularity may be seen. It grows readily

on a variety of culture media and most readily on the modified blood serum first introduced by Loeffler. When cultivated on potato it is much larger and more irregular in form than when grown on any other medium. The organism is pathogenic for a number of animals, especially for young cats and guinea-pigs. In guinea-pigs the most virulent form of the organism will prodnce death in from 36 to 48 hours. Like some other organisms there is a marked difference in its virulence. While cultures from some cases will always produce death in 36 hours, in others death will not take place for several days ; and in others again the animal may survive the primary inoculation, and afterwards die of paralysis after an interval of three or four days. Again, in still other cases no results may follow the inoculation.

The histology and the histogenesis of the diphtheritic membrane have been closely studied by Weigert and other investigators. The diphtheritic membrane is due to a combination of necrosis and inflammation. The essential factor which determines the production of the membrane is necrosis of the surface epithelium. The necrotic tissue supplies the fibrin ferment, and fibrin is formed from the serous exudation which comes in contact with the necrotic tissue, and however a necrotic tissue may be produced on a mucous surface we shall have a certain amount of fibrinous exudation in and on this. The inflammation characterized by the presence of a membrane on the inflamed surface is known as *diphtheritic inflammation*, however it may be produced, and it does not necessarily have any connection with the infectious disease *diphtheria*. We see the same thing in other pathological processes. We may have suppuration produced by a large number of bacteria. While each form of suppuration has more or less distinct characters given it by the micro-organism causing it, we cannot easily distinguish between the various ones. We may also have fibrinous pneumonia produced in a number of ways, and we cannot always distinguish anatomically the fibrinous pneumonia produced by the pneumococcus from that produced by the streptococcus and other organisms. If we regarded the suppuration produced by one organism, as the staphlococcus aureus, as a definite infectious disease, we can see in what confusion we would be thrown in attempting to separate this by its

anatomical features from other suppurations. The *diphtheritic inflammation* is essentially an anatomical process. The name is one well chosen, because it simply refers to the presence of a membrane which is the common feature. It is perhaps unfortunate that the name diphtheria is given to the infectious diseases we are considering, because the name tends to confuse the disease with other pathological processes in which there is also inflammation with the production of a membrane.

In diphtheria the formation of the membrane usually begins in the tonsils, and in most cases the primary infection seems to take place here. Not only do the various crypts and depressions in the tonsils form a suitable place for the lodgment of the bacilli and their growth, but the protecting mucous membrane is thinner on the tonsils than elsewhere. In some places on the surface of the tonsils the sub-epithelial tissue may be exposed. There is very frequently a mild degree of inflammation of the tonsils which may lower the resistance of the tissues to infectious organisms. From the tonsils the membrane may extend over the pharynx, the palate, the base of the tongue and into the air passages. In the air passages it may extend from the larynx into the trachea, and even into the ramifications of the bronchi. Sometimes the membrane extends in an almost continuous layer over all these parts. Sometimes only small isolated patches are found. In general, when the large continuous membrane is formed it is due to confluence of smaller patches. The membrane may be confined to the tonsils, and even to one tonsil, but it generally extends over both. The membrane presents a dirty gray, and in some cases a brownish color, which may vary greatly in its thickness, and may be more or less adherent. After death its connection with the tissue beneath is less firm than in life, and it may be stripped off in large shreds. The adhesion of the membrane to the tissue beneath varies in different places. In the air passages it is less adherent than in the pharnyx, and not unfrequently even during life large masses of the membrane may be separated and coughed up. The reason for this difference is found in the anatomical character of the mucous membrane in the two places. In the air passages beneath the epithelium there is a dense basal membrane which forms

a limit to the pseudo-membrane. In the pharynx this basal membrane is not present, or certainly not to the same degree. In the pharynx the tissue beneath the epithelium is involved, and there is frequently a direct connection between the fibrin composing the membrane and the patches of fibrin in the tissue beneath. The membrane also extends down into the crypts of the tissue and into the mucous glands, and in this way it is made more adherent. The epiglottis also shows a varying degree of involvement in the process. There may be only small foci scattered over the surface of this, or the entire epiglottis may be converted into a dense, hard, necrotic mass filled with fibrin. The diphtheritic membrane is not on the surface of the mucous membrane, but the mucous membrane itself forms a part of it. After removal of the membrane, ulcers varying in extent and depth are produced. Vessels are ruptured and small hemorrhages are produced in the tissue beneath. The ulcers vary in depth; sometimes they are superficial, at others they extend for some distance into the tissue. The mucous membrane adjoining the diphtheritic membrane is intensely injected, and there are swelling and œdema of all of the affected parts.

On microscopic examination of the membrane itself, it is found to be composed almost entirely of fibrin and of necrotic tissue which has undergone fibrinoid metamorphosis. We find in the membrane both small masses of fibrin, which may be recognized as such, and large, irregular, refractive masses forming a net-work which has all of the essential characteristics of fibrin as shown by staining. These large hyaline masses are produced by a direct metamorphosis into fibrin of the necrotic epithelium, and of the pus cells in the inflammatory exudation. Within the membrane we rarely find any well preserved cellular elements. In some cases, however, it may contain a considerable number of pus cells. In the tissue beneath the membrane we find evidence of the most intense inflammation. The tissue is swollen, œdematous, and infiltrated with an inflammatory exudation. The blood vessels are dilated, and contain numerous pus cells; the pus cells are also found throughout the tissue, both diffusely scattered and in groups. The necrosis is not directly confined to the surface, but from the surface it extends irregularly into the tissues beneath. The

necrosis is here also accompanied with a formation of fibrin, and the fibrin of the membrane frequently forms a direct connection with the fibrin in the tissue beneath, which leads to a greater degree of adhesion. When sections pass through the membrane, and also involve the adjacent tissue, around the edges it will be seen that the membrane frequently extends over the unchanged epithelium surface.

All of the lymph glands in the vicinity are enormously swollen, and after death, in the majority of cases, we find a general lymph adenitis. In certain places the lymph glands are more involved than in others. The lymph glands involved to the greatest extent are the cervical and the bronchial lymph glands, the lymph follicles of the intestines and the mesenteric glands. In the intestines there may be such an involvement of the solitary lymph follicles and Peyer's patches that we may have appearances resembling the beginning of typhoid fever. The spleen is unusually swollen, the liver, kidney and heart show marked granular, and sometimes fatty degeneration. In the kidneys there may be a definite acute nephritis, but this is rarer in diphtheria than in scarlet fever and some other infectious diseases. Lesions in the lungs are constantly found. These lesions consist of bronchitis and areas of broncho-pneumonia, sometimes very extensive, and more common in the lower posterior portions of the lungs.

On microscopic examination of the tissues we find the lesions first clearly described by Oertel. In almost all of the tissues, both those in which macroscopic changes were found, and in those in which no mascroscopic lesions were apparent, we find small areas appearing under low powers of the microscope somewhat like tubercles. These small areas consist in circumscribed necrosis of the tissue cells, with breaking up of the nuclei, and some formation of fibrin. They are more common and more extensive in the lymph glands than elsewhere. These microscopic foci of necrosis with nuclear fragmentation are the most definite anatomical lesions of diphtheria, probably more characteristic than the membrane. While they are undoubtedly present in other infectious diseases, notably in the liver in cases of typhoid fever, in no other disease than diphtheria are they so numerous and so generally distributed in all the organs.

The lesions produced in animals by inoculation are of the same character as those seen in man. When a small amount of a pure culture of the diphtheritic bacillus is placed beneath the skin of the animal, at the seat of inoculation there is a necrotic fibrinous inflammation. If the skin is removed over a part, and the wound is inoculated, a fibrinous inflammation on the surface is produced. The lymph glands are swollen, and the same necrotic foci are found in all of the tissues which are seen in man. When the inoculation is made on the surface of the conjunctiva or on the pharynx a definite membrane is produced.

In man the action of the diphtheritic bacilli is frequently complicated by the action of other organisms. There are other pathogenic organisms almost constantly present in the mouth, and of these probably the most important are the streptococcus pyogenes and the diplococcus lanceolatus. The staphylococcus aureus was found in our cultures a number of times, but by far not so frequently as the streptococcus. It is uncertain whether the straphylococcus is capable in itself of exciting a fibrinous inflammation with the production of a membrane. In all cases in which a definite membrane was found, either the diphtheria bacilli or the streptococci were found. The fibrinous inflammations due to the streptococci are frequently found accompanying other infectious diseases, or they may be found alone. The streptococcus is certainly an active agent in producing most of the throat affections which are found accompanying scarlet fever and measles, particularly the former, although, as we shall see, cases of mixed infection between diphtheria and scarlet fever, marked by the presence of diphtheria bacilli, are not very uncommon. Although the appearance produced by the two organisms, the diptheria bacillus and the streptococcus, may be so exactly similar that they cannot be distinguished from one another during the life of the individual, after death, as a rule, we are able to distinguish between them. The diphtheria bacillus is not a pus producing organism. It does not have the same power of dissolving the tissue and leading to the formation of an abscess as has the pus organisms. Its action further is one almost entirely superficial, and does not tend to invade the adjacent tissues. After death, in the pseudo-membranous affections of the throat accompanying

scarlet fever, the membrane is, as a rule, not so thick, and cannot be so readily removed as in cases of diphtheria. It is almost always confined to the pharynx, and has no tendency to invade the epiglottis or the air passages. The redness and œdema of the surrounding parts is more marked than in diphtheria. Not infrequently definite abscesses are found, either in the submucous tissues or in the lymphatic glands. The organisms reach the lymphatic glands along the lymphatics, and frequently white lines of purulent infiltration of the tissue can be traced from the local lesion to an adjoining lymphatic gland in which the abscess is formed. On microscopic investigation the streptococci are found in great abundance in the tissue. Usually their presence is not complicated with that of other organisms. In other cases staphylococci may be found with them. When the staphylococci are present abscess formation is usually more common than when the streptococci alone are present. In cases of death from scarlet fever, if the throat lesions are extensive, there is nearly always a general infection of all of the organs of the body with streptococci. They are found in pure cultures in the heart, kidneys, spleen, liver, and lymphatic glands. There is good reason to believe that this secondary infection with streptococci is the cause of the nephritis which so often accompanies scarlet fever. In two cases of scarlet fever in which autopsies were made at the City Hospital, and in which there were very extensive throat lesions and general infection with streptococci, acute nephritis was found. In another case in which no throat lesions were found there was no nephritis and no general infection with streptococci. The streptococcus is so commonly found associated with scarlet fever that many have thought of the possibility of this organism being the cause of the disease. We think it more probable that it represents simply an accidental infection, the accompanying inflammation of the throat affording it suitable opportunity for development.

After death from diphtheria, the diphtheria bacillus is not found in the various organs of the body. We have never found it either in cultures made from the organs, or from direct microscopic examination. For a long time it has been held that the action of the diphtheritic bacillus was essentially a local one, confined to the place where the membrane

was found. Recently Frosch has obtained the organism in the various organs of the body in 10 out of 15 cases of diphtheria. The method which he used was to take large masses of the various organs and smear them over the surface of the culture tube. In this way he succeeded in getting the organisms in the liver, speen, kidneys and heart blood. Abbott has found that when the diphtheritic bacilli are directly injected into the testicles of the guinea-pig small inflammatory foci are found in the peritoneum and in the omentum, which contained large numbers of organisms. In Abbott's cases, however, it would seem more probable that the presence of the organisms in these places should not be regarded as a definite infection of the tissues, but as a local inoculation. The testicle has an abundant supply of lymphatics, which pass to the retro-peritoneal lymph glands and anastomose with the lympathics of the peritoneum generally, and it is extremely probable that the bacilli were directly injected into the places where they were found. In the case in which Frosch found the organism, he was only able to do so by using large quantities of the tissue. It is possible that an occasional organism may enter into the blood, and may be deposited in the organs, and he obtained them by using large quantities of the material, but this cannot be by any means constant, for the general weight of evidence is entirely opposite to this.

In the course of the investigations on diphtheria there were a number of cases in which mixed infection with diphtheria and other diseases was found. Dr. Williams has reported these cases in full. As might be supposed, scarlet fever was more frequently found associated with diphtheria than any other disease. One of the most interesting cases of mixed infection was that with typhoid fever. That pseudo-membranous inflammations of the throat appear in cases of typhoid fever has long been known, and has been especially described by Wagner. Wagner called attention to the fact that these pseudo-membranous inflammations of the throat accompanying typhoid fever were more frequent when epidemics of diphtheria prevailed at the same time. While it is not at all sure, or even probable, that all of the pseudo-membranous inflammations of the pharynx in typhoid fever are due to the Klebs-Loeffler bacillus, this gives at

least one positive case in which the organism was found. On the same day cultures were made from a case of virulent diphtheria, from a case of pseudo-membranous inflammation accompanying scarlet fever, and from a case of typhoid. In all three the identical organism was found. Inoculations of guinea-pigs were made at the same time from the cultures obtained from the three cases. All three of the guinea-pigs died within 36 hours, and the organisms were recovered from the inoculated animals in all cases. The pseudo-membranous inflammations accompanying typhoid are much more frequent than is generally supposed. That they are not more often recognized clinically is due to the fact that the hebitude of the patient prevents any symptoms of the throat affection from appearing, and his condition usually interferes with a thorough examination of the pharynx. In our experience the membrane is more apt to be found just at the beginning of the œsophagus on the posterior pharynx wall than at any other place. Like the scarlet fever pseudo-membranes it is very probable that they are generally produced by the streptococcus, but so far as we know no bacteriological examination has been made in these cases.

We have also found the diphtheria bacillus in one case of inflammation of the middle ear following diphtheria, and in two cases of inflammation of the middle ear following measles. In the two cases of measles there was no affection of the throat at the same time. Such cases represent accidental infection with the diphtheritic bacilli analogous to the accidental wound infections with the erysipelas organisms or with the pus organisms. We have had no cases of wound infection with diphtheria bacilli. The organism has also been found in cases of pseudo-membranous angina accompanying measles. Although here, as in scarlet fever, it is most probable that the organism which produced the pseudo-membrane is, in most cases, the streptococcus.

A great deal of interest has of late been excited by the cases in which without any pseudo-membranous inflammation of the throat, so far as could be seen, the Klebs-Loeffler bacillus has been found. Several such cases have been reported. In his early publication, Loeffler has reported one case in which the bacillus was found without any pseudo-membranous inflammation of the throat, and cases

have since been reported. It has been supposed in these cases the disease could be produced without a local lesion. All of these cases, however, have been clinical. We know of no case in which the entire pharynx and respiratory tract, including the nares, have been examined for lesions. The lesions might be slight, and could very well escape a purely clinical observation. Cases are not uncommon in which lesions have been found in the respiratory tract alone, and found in the nares alone. There have been a large number of cases of membranous rhinitis reported in which the diphtheritic bacilli have been found. The absence of the pseudo-membrane in the places where it is ordinarily found, is by no means a proof that is not present. All of the essential symptoms of the disease, the internal lesions, the paralysis, the circulatory disturbances are so clearly due, not to the presence of the bacilli themselves, but to a chemical poison produced in the local lesions, that we cannot conceive of a diphtheria without local lesions from which absorption can take place. All of the lesions of the disease in the internal organs, including paralysis, are produced by inoculating animals with the chemical products of the bacilli just as certainly as by the diphtheritic bacilli themselves.

Like other organisms, the Klebs-Loeffler bacillus varies greatly in virulence. A great deal of interest has been excited by what has been called the pseudo-diphtheritic bacillus. It is known that organisms are found which are apparently in morphology, and culture, identical with the Klebs-Loffler bacillus, but which show a decided difference in virulence. Inoculation of guinea-pigs with these bacilli is followed either by no results at all, or by very slight local lesions without any general affection. They have been found in very slight lesions of the throat, with a slight pseudo-membrane and without any systemic affection. They have also been found in several local lesions. There can be little doubt now that this so-called pseudo-diphtheritic bacillus represents simply a modified, less virulent form of the diphtheritic bacillus. Abbott has shown that around the seat of inoculation the lesions are found, though differing in extent, which are produced by the virulent organism. As we have said before, every degree of virulence of the organism, as shown by its action on guinea-pigs, may be seen.

The most virulent cultures produce death in 36 hours, and from this, depending on the virulence of the organism, either the duration of life after inoculation is lengthened or no effects are produced. The throat lesions, which are produced by the modified organism, may be fully as severe as when the virulent organism is present. In some cases the mildness of the course of the disease may be due not to a modification of the virulence of the organism, but to lack of absorption. We have found cases in which there was apparently no absorption of the virus, although the membrane in these cases may be extensive, although the organism, as tested on guinea-pigs, may have the most virulent character. The patient declares himself well, and the pulse and the temperature may show but little variation from the normal.

There is no doubt that the danger in diphtheria chiefly lies in the absorption of the virus which is produced locally, and this does not take place with anything like the same readiness in adults as in children. This is probably due to the more delicate tissues of the child, its greater vulnerability, and possibly a greater ease of absorption. It is very probable, however, that just as there are differences in the different cases to the degree of susceptibility to the local action of the diphtheria bacilli of the mucous membrane, there are also differences in the susceptibility to this systemic poisoning.

There are two methods by means of which diphtheritic bacilli, when present, may be detected. One is by means of the direct microscopical examination of the membrane. Small pieces of the membrane can be pulled off with forceps, or a pledget of cotton may be rubbed over the surface of the membrane, and afterwards rubbed directly over cover-slips. These are then heated and stained in the usual methods. The staining which we have found uniformly best suited is the Loeffler's solution of methylene blue, consisting of methylene blue, dissolved in a weak solution of caustic potash. The bacilli are frequently present in large numbers, in other cases but few are seen. They may be distinguished by their form alone from the other organisms of the mouth, though there may be organisms present which very closely resemble them in form. As a rule they are not homogeneously de-

posited over the preparation, but are more apt to be found in small masses and clumps. The organisms with which they are most frequently found associated are the various micrococci, which may be arranged either in chains or in the staphylococcus form. Along with the micrococci there may be present long or short bacilli varying greatly in size, and curved forms. In rare cases they may be found in great numbers unmixed with other forms. As a general rule the more abundant the various organisms which are found in the preparations, the less probability is there of the case being one of diphtheria.

While this method will certainly yield valuable results in the hands of the experienced investigator, there is always a considerable amount of difficulty in distinguishing the diphtheritic bacilli from other organisms. When present in large numbers and arranged in masses, they can be readily distinguished, but when very few or single organisms are present it is impossible to distinguish them by form and size alone, and we have no method of distinguishing them by staining, such as we have in the cases of tubercle bacilli. A much readier way is found in the methods of culture. In this we have, as the most available method to procure the material for culture, a pledget of cotton closely wrapped around the end of a wire. A number of these wires are prepared, enclosed in test tubes, and sterilized by heating in the hot-air sterilizer. After sterilization they are carried to the wards still enclosed in the test tubes. The wire is then removed from the tube, and the cotton pledget is rubbed over the membrane. Frequently small pieces will adhere to the pledget; then the test tube is labeled and sent to the laboratory. At the laboratory cultures are made on the blood serum and sugar bouillon, which was recommended by Loeffler. This is prepared in large quantities and kept on hand. It consists of blood serum obtained from the slaughter house, and mixed with ¼ its volume of bouillon containing 1% of grape sugar. This is then poured into test tubes, from 10 to 15 cc. being placed in each one, and these are then sterilized in a leaning position to give a large extent of surface. At first we always used the fractional sterilization, heating the material on successive days up to a temperature of 62. So many of the tubes spoiled, how-

ever, that lately we have adopted the plan of heating it at once up to the boiling temperature, and then sterilizing it on successive days, just as we would with any other medium. The heat coagulates the blood serum and renders it opaque. The organisms grow on it with great readiness, and the opacity interferes very little with the proper recognition of the colonies. We have tried various media, human blood serum among others, but the organisms grow very much more readily upon serum derived from cattle than upon any other medium. The pledget of cotton on the end of the wire is rubbed over the slanting surface of the test tube, which is then placed in a warm chamber. At the end of 20 hours, if diphtheritic bacilli are present, an abundant growth will be found on the surface of the test tube. The organisms grow as small isolated colonies, frequently scattered over the surface. Of course the swab from the throat contains in almost all cases numerous other organisms, as well as the diphtheritic bacilli, and if all these organisms grew equally well it would be impossible to distinguish the different species. Fortunately, however, but few of the organisms present in the throat find suitable conditions for their growth in our ordinary mode of culture. The diphtheritic bacilli may be found alone, but usually other forms, both micrococci and bacilli, are found with it. The micrococci are usually the diplococcus lanceolatus, streptococci and staphylococci. Streptococci are more frequent than other forms. One of the most common bacilli found is a short organism growing in pairs with pointed extremities. There is nothing absolutely characteristic of the macroscopic appearance of the growth of the diphtheritic bacillus in these primary cultures, although pure cultures on test tubes made from these primary cultures are more characteristic. It is impossible to tell by the macroscopic appearance the colonies of diphtheritic bacilli from the colonies of both streptococci and staphylococci. After 20 to 24 hours the cultures are removed from the culture chamber, and the various colonies examined microscopically. The masses of bacilli in the colonies are recognized in this way much more easily than by the simple direct examination of preparations made from the throat. In doubtful cases it is always well to make inoculations on animals.

There can be no doubt of the importance of such investigations. When we can make a perfectly definite diagnosis, we know what we are doing; we know that in certain cases we have to do with the true diphtheritic organism, and in other cases only with a mild and possible non-infectious organism. It is impossible to separate the cases of diphtheria from other pseudo-membranous inflammations in any other way. We know that cases in which the virulent organism is found may run a very light clinical course, and without the presence of the bacillus we might not think it necessary to guard against infection. In the absence of a definite diagnosis made by bacteriological investigation, the the only safe way is to consider every case in which pseudo-membranous inflammation of the throat is found, whatever its character, however mild the clinical symptoms may be, as a case of true infectious diphtheria.

Of late considerable attention has been given to the pseudo-diphtheritic, or, as they have been called, the diphtheriod affections of the throat. By this we do not mean cases of pseudo-membranous inflammation simulating the pseudo-membranous inflammations found in diphtheria, but other inflammations of the throat in which the appearances simulate a pseudo-membrane. Too frequently in practice every sort of white deposit and discoloration in the pharynx is regarded as a membrane. The membrane found in the membranous inflammation is perfectly distinct anatomically, whatever may be its ætiology. It is always dense and firm, and is made up of fibrin and degenerated cells. In the diphtheriod inflammations we may have masses of detritus, consisting of cast off epithelium, mucus, and masses of bacteria, collected on the surface of the mucous membrane, and frequently extending into the follicles. This can easily be told from the membranes, because on touching it with the needle, the needle sinks into it, and it can be removed, not as a membrane, but as a more or less granular mass. Examining under the microscope, the whitish deposit is frequently seen to be composed almost entirely of masses of bacteria of the most varied forms. We find it in quantities of bacteria, spirillæ and micrococci. It is evident that these organisms find in the collections of mucus and cast-off epithelium a suitable culture medium, and they grow and

develop in this. Sometimes these deposits are accompanied by considerable swelling, irritation and other evidences of inflammation; and when removed there may be here and there a very slight fibrinous inflammation beneath them. It is not uncommon to have a high fever and considerable constitutional disturbances in these cases, but the condition runs its course in a few days, and is attended with little danger.

ARTICLE VIII.

THE ANNUAL DISCOURSE.

THE LEGISLATIVE CONTROL OF MEDICAL PRACTICE.

By REGINALD H. FITZ, M.D.
OF BOSTON.

DELIVERED JUNE 13, 1894.

NOTE.—At an Adjourned Meeting of the Massachusetts Medical Society, held Oct. 3, 1860, it was

Resolved, "That the Massachusetts Medical Society hereby declares that it does not consider itself as having endorsed or censured the opinions in former published Annual Discourses, nor will it hold itself responsible for any opinions or sentiments advanced in any future similar discourses."

Resolved, "That the Committee on Publication be directed to print a statement to that effect at the commencement of each Annual Discourse which may hereafter be published."

THE LEGISLATIVE CONTROL OF MEDICAL PRACTICE.

Mr. President and Fellows
of the Massachusetts Medical Society:

With the advancement of learning, and the progress of civilization, it has been found necessary for those in authority to exercise more and more control and restraint upon such as are engaged in the practice of medicine.

As it became evident that the name of physician or surgeon was offered in excuse for the grossest ignorance or neglect, or to incite the actual destruction of human life, laws were passed to aid the victim of malpractice, and to punish the criminal abortionist.

When it appeared that sane persons were sometimes, and perhaps for the worst of motives, placed under restraint, justified only in the case of lunatics, a physician's certificate became necessary for the commitment of the insane.

The public has learned that the surest way of controlling the ravages of contagious disease is by the isolation of the earliest cases, and that for the protection of the well, even arbitrary measures of isolation may be found necessary. It, therefore, makes it the duty of the physician to notify immediately the proper authorities when he knows that he has seen a case of cholera or small-pox,

diphtheria or scarlet fever, that the community may rest assured that suitable measures are being taken to protect the healthy. Elaborate and costly quarantine methods, useless without the services of intelligent, skilful and especially trained physicians, are established for the same purpose. In addition, vaccination, compulsory if need be, must be guaranteed by the physician to promote the same object.

He must make a return of the birth at which he assists, and must furnish a certificate of the cause of death. When there is reason to suppose that the latter has occurred under suspicious circumstances, the community orders that these shall be satisfactorily investigated by physicians of its own choice, if it sees fit.

The people thus demand, and submit with more or less eagerness or readiness to certain attempts at regulating the practice of medicine. They admit the necessity of the control, and they require qualifications, which only combined intelligence, education and honesty can provide. They seek for them in physicians, and expect the latter to possess them.

It is well recognized among those possessing the best opportunities for judging that patients are at times treated with reckless ignorance or negligence, and die in consequence; but no verdict of homicide is rendered. Ignorant and unskilful persons have often assumed to treat patients in a medical way, have caused injury, and have not suffered civil damages. Equally ignorant and un-

skilful pretenders to practise do not know the symptoms of contagious disease, do not suspect its presence, make no report to the proper authorities, suggest no isolation, and are the direct cause of the spread of diphtheria, of scarlet fever and the like from house to house and from district to district. The physician's record of the cause of death not infrequently conceals criminal abortion, sometimes manslaughter, and is often indicative of such ignorance as to be wholly worthless.

Nowhere in the Union is the possibility of these evils greater than in Massachusetts. In this State any one who chooses may practise medicine. He has but to announce himself a physician and he becomes one. He may assume a title to which he has no claim, and may place a forged certificate upon his walls. He may advertise himself a graduate of any institution he prefers; may claim to have accomplished any number of cures of what have been pronounced incurable disease. He may promise preventives and specifics against any and all maladies; he may publicly announce the most glaring untruths — all for the sake of deceiving and fleecing a credulous public—and the law cannot interfere with his actions. We are repeatedly told that our law makes no distinction between the various schools of medicine, or between the various kinds of practitioners. Members of this society, homœopathists, eclectics, clairvoyants, faith-curers, mind-healers, Christian scientists, are alike legally qualified as physicians. Since the people demand, at times under penalty,

services from physicians which only intelligence, education and honesty can supply, and since it is a matter of common knowledge that many stupid, ignorant, and dishonest pretenders to practise exist, it is clearly the duty of the State to discriminate between the two, to legally qualify those who deserve the confidence of the people, and to disqualify those who are often the abettors of crime, the victimizers of youth and the constant source of danger to every member of the community.

The object of such legislation is unmistakable. It is for the protection of the entire community, but especially for that portion of it less favored by education or fortune, by experience or knowledge. Its design is to promote their health, happiness and prosperity by giving them a means of deciding to whom they shall apply for intelligent, skilful and honorable aid in the time of need, often so sudden and unexpected in its coming. It enables them to determine by the only feasible means who is educated and who is not, what physicians are deserving of esteem and consideration, and what practitioners are pretenders, sometimes honest, perhaps, usually specious and presumptuous, and generally woefully ignorant.

To license the physician does not imply that he is not to treat his patients in any way he or they may prefer. It should mean that he is to show, before being allowed to treat disease, that he can discriminate between those which are dangerous to the individual and those which are a source of

peril to the public. The former may, perhaps, take his life in his own hands, but he should not be allowed to imperil that of his neighbors.

Such a law offers no protection to the licensed physician, who can take care of himself. His education and opportunities have taught him to whom he is to go for suitable advice. Nor does it favor his occupation, since the more unskilful or negligent treatment in the community the more the demand for the services of the skilled and upright physician.

The many who ask for this protection and appreciate its need, suffer from the few, who, ignorant of the necessity, are deceived by false pretences, or are blindly devoted to a theory.

The numerous attempts at the legislative control of medical practice which have been made in the past twenty-five years show that these aims may be accomplished to a certain extent. Every effort meets with opposition, and it is to the nature of the latter and the arguments it offers that your attention is now requested.

Such opposition is diverse and its motives extremely mixed.

On the one hand is to be found the entire class of those likely to be shown ignorant, unskilful, dishonest or corrupt. These are encouraged and supported by those whose occupation it is to systematically oppose all antagonistic legislation — for a consideration. On the other hand we see intelligent theorists and educators, at times leaders in thought and morals, who object to the infringe-

ment of personal rights, or the exercise of paternal care by the government. With these are associated respected leaders of the profession who have vigorously and persistently struggled for the highest possible standard of medical qualification, and oppose or discourage all measures which fall short of it. Thorough supporters of some medical legislation, they are determined opponents of all plans of which they cannot approve. These leaders of the opposition are followed by a considerable number of citizens, insufficiently educated, often ill-balanced, and frequently influenced by arguments of the most specious and superficial character.

In general the grounds for the opposition to the legislative control of the practice of medicine are the following assertions:

It invades personal liberty.
It legislates for a class.
It tends to obstruct the progress of therapeutics.
It is unnecessary.
It is not wanted.
It has proven a failure.

Let us consider these somewhat in detail.

It is claimed to be a violation of personal liberty, since it denies to some their right to pursue the occupation they desire and to others the right to select as medical adviser any person they please.

Herbert Spencer is usually quoted as the leading exponent of this view. He says:[1]

[1] Social Statics. 1851. 373.

"If it is meant that to guard people against empirical treatment, the State should forbid all unlicensed persons from prescribing, then the reply is, that to do so is directly to violate the moral law. * * * *

"The invalid is at liberty to buy medicine and advice from whomsoever he pleases; the unlicensed practitioner is at liberty to sell to whomsoever will buy. On no pretext whatever can a barrier be set up between them without the law of equal freedom being broken; and least of all may the government, whose office it is to uphold that law, become a transgressor of it.

"Moreover this doctrine, that it is the duty of the State to protect the health of its subjects, cannot be established, for the same reason that its kindred doctrines cannot, namely, the impossibility of saying how far the alleged duty shall be carried out. Health depends upon the fulfilment of numerous conditions—can be 'protected' only by ensuring that fulfilment; if, therefore, it is the duty of the state to protect the health of its subjects, it is its duty to see that all the conditions of health are fulfilled by them * * * * * enact a national dietary; prescribe so many meals a day for each individual; fix the quantities and qualities of food, both for men and women; state the proportions of fluids, when to be taken, and of what kind; specify the amount of exercise, and define its character; describe the clothing to be employed; determine the hours of sleep, allowing for the difference of age and sex * * * * * and to enforce these regulations it must employ a sufficiency of duly qualified officials, empowered to direct every one's domestic arrangements."

It is to be remembered that this argument of Mr. Spencer is directed against placing restrictions upon "empirical treatment," which is regarded as a violation of the moral law. But let us quote further:[1]

"Let it be conceded that very many of the poorer classes are injured by druggists' prescriptions and quack medicines. * * * *

[1] *Loc. cit.*, 377.

"Inconvenience, suffering and death are the penalties attached by nature to ignorance, as well as to incompetence—are also the means of remedying these. * * * * * * All means which tend to put ignorance upon a par with wisdom, inevitably check the growth of wisdom. Acts of parliament to save silly people from the evils which putting faith in empirics may entail upon them, do this, and are therefore bad. Unpitying as it looks, it is best to let the foolish man suffer the appointed penalty of his foolishness. For the pain— he must bear it, as well as he can; for the experience—he must treasure it up, and act more rationally in the future."

This argument of more than forty years ago is persistently brought forward whenever the question is raised of the control of medical practice by the State. It is usually overlooked that it relates especially to prescribing, whereas the practice of medicine includes other considerations than that of providing means of treatment.

Despite the reasoning of Mr. Spencer the government finds it necessary to take certain steps, theoretically objectionable, for the protection of the health of the individual. It does not prescribe the number of meals per day, or the proportion of fluids and solids, the amount and character of the exercise, the kind of clothing and the hours of sleep. It does, however, insist that food offered for sale shall be unadulterated and wholesome; that water supplies shall be uncontaminated; that noxious trades shall be rendered, as far as possible, harmless; that clothing shall be made under certain conditions. The state cannot protect the health of its subjects in every respect; but it everywhere endeavors to ac-

complish something. Even Mr. Spencer may be quoted in approval:[1]

"He who contaminates the atmosphere breathed by his neighbor, is infringing his neighbor's rights * * * * and in the discharge of its functions as protector, a government is obviously called upon to afford redress to those so trespassed against."

Professor Huxley's name is usually coupled with that of Mr. Spencer as an opponent to placing restrictions upon the practice of medicine. His words are as follows:[2]

"In my judgment the intervention of the State in the affairs of the medical profession is to be justified * * * * simply and solely upon the ground that the State employs medical men for certain purposes, and as employers, has a right to define the conditions on which it will accept service. It is for the interest of the community that no person shall die without there being some official recognition of the cause of his death. It is a matter of the highest importance to the community that in civil and criminal cases, the law shall be able to have recourse to persons whose evidence may be taken as that of experts; and it will not be doubted that the State has a right to dictate the conditions under which it will appoint persons to the vast number of naval, military and civil medical offices held directly or indirectly under the government. Here, and here only, it appears to me, lies the justification for the intervention of the State in medical affairs."

Although this plea that the regulation of the practice of medicine is a violation of human rights has regularly been brought forward for the purpose of exciting sympathy, it has repeatedly been declared by the courts, except in New Hampshire, to be invalid.

[1] *Op. cit.*, 372.

[2] *Nineteenth Century*, 1884; XV., 228.

It is best answered in the words of Judge Williams:[1]

"In a certain sense it is true that every man has a natural right to follow out the bent of his inclination, and be a clergyman, a lawyer, a doctor, a scavenger, a pedlar, an auctioneer, just as he may choose. But, it is not true that a man can practise any one of these professions or occupations except he does it upon such terms as the law imposes, and the law can impose just such terms upon any one of these professions or employments as the legislators in their discretion deem best for the interest of the community. * * * * *

"The right to practise medicine is a mere statutory privilege, subject to be changed at any time by the legislature."

It is claimed to be class-legislation, producing a monopoly, and, therefore, unconstitutional. We have again a statement, which is offered to excite sympathy, although its illegality has been demonstrated. It is everywhere recognized that legislation designed for the welfare of the people is the duty of the State, and is approved, if not demanded, by the public. The only question is to what extent shall such class-legislation be carried. The people alone are to decide. Licenses are given to peddlers, plumbers and apothecaries, to dealers in liquor, milk and oleomargarine. Pilots must show a familiarity with the dangers to navigation in the waters through which they undertake to guide vessels, before they can be permitted to take charge of them. Surgeons must be examined as to their medical and surgical knowledge before they can be appointed to the service of the

[1] Rep. Ill. State Board of Health, 1885, VII., 432.

militia. These are but a few of the illustrations that such class-legislation as is contemplated in the licensing of physicians is taking place constantly and with uniform approval. It does not create a monopoly, since it does not limit the practice of medicine to any particular sect or school. Any person can still become a physician by taking the necessary steps to secure a proper preparation for an occupation which is generally conceded to be one of great responsibility, and one demanding a various training. What is open to all is no monopoly. But this objection, too, has been definitely settled by the decision of the Supreme Court of the United States, given by Mr. Justice Field in the case of Dent *v.* West Virginia.[1]

According to him

"there is no arbitrary deprivation of such right where its exercise is not permitted because of a failure to comply with the conditions imposed by the State for the protection of society. The power of the State to provide for the general welfare of its people authorizes it to prescribe all such regulations as, in its judgment, will secure or tend to secure them against the consequences of ignorance and incapacity as well as of deception and fraud. * * * * * The nature and extent of the qualifications required must depend primarily upon the judgment of the State as to their necessity. * * * *

"We perceive nothing in the statute which indicates an intention of the legislature to deprive any one of his right. No one has a right to practise medicine without having the necessary qualifications of learning and skill; and the statute only requires that whoever assumes, by offering to the community his services as a physician, that he possesses such learning and skill, shall present evidence

[1] 129 U. S., 114.

of it by a certificate or license from a body designated by the State as competent to judge of his qualifications.

* * * * * *

"There is nothing of an arbitrary character in the provisions of the statute in question; it applies to all physicians, except those who may be called for a special cause from another State; it imposes no conditions which cannot be readily met."

We are told that a law to license medical practitioners will obstruct the progress of therapeutic knowledge, since certain so-called healers and curers will refuse to be examined for a license. This class is likely to include the hydropaths, psycho-paths, nature-paths, omnipaths, mind-healers and faith curers, spiritualists, mesmerists and Christian scientists, botanic, hygienic and Indian physicians, the seventh son of a seventh son, and the retired clergyman whose sands of life have nearly run out, and the like.

They will refuse to be examined, since they are conscious of their inability to pass an examination, or they may claim that they will suffer a loss of therapeutic power by acquiring knowledge of the anatomy and physiology of the body or of the symptoms and diagnosis of disease. These people should not be licensed unless they submit to the requirements which are deemed sufficient to test the qualifications of physicians. There need, then, be no interference with such therapeutical experiments as they and their patients see fit to carry on, at their own exclusive risk.

The demand for such persons, under some title or other, will always exist. There are many worthy

citizens, some of a high degree of intelligence in many things, who firmly believe that most remarkable and wonderful cures have been accomplished by such "healers." They are told, and are willing to believe, that the latter possess the gift of healing, and have "divined" the successful treatment of disease. Such miraculous cures have been reported in all ages, but the methods of their accomplishment have proven no commendable additions to therapeutic knowledge. They are recognized as dependent upon mental peculiarities, by no means to be encouraged, of the patient, and equally striking and frequently objectionable characteristics of the practitioner.

We are told that the latter will refuse to be examined because he may lose his power. It is to be remembered that Christian scientists are not the only practitioners who have obtained successful results by the use of faith. Dishonest charlatans have been as fortunate as religious enthusiasts, and eminent physicians have proven quite as successful as either. Mental therapeutics may accomplish wonderful results in certain instances, but the ability to use it is in no respect limited to persons ignorant of any claim to medical knowledge. It may well be admitted that there are some patients who will recover under certain therapeutists, but not when licensed physicians attempt their treatment. It is unfair to deprive such individuals of this possibility unless there is a risk to others.

Even Mr. Spencer recognizes the importance of

restraining those "who contaminate the atmosphere," and no person should be allowed to undertake the treatment of the sick without previously having given evidence of a sufficient knowledge of the means of recognizing contagious diseases and the measures to be adopted to check their dissemination.

There are those who claim that were there no other objection to the further control of medical practice it is unnecessary, since it would add but an infinitesimal degree of security to the citizen's chance of being faultlessly treated when sick, and the people are already protected by the existing laws against malpractice and manslaughter.

No honest and intelligent physician of practical experience claims to treat faultlessly a sick person. No sensible physician, familiar with the seats and causes of disease, believes that it ever will be possible to always treat faultlessly the sick person, provided it is meant by this phrase to cure him of his disease. But the treatment of the sick person is but a part of the doctor's duty. To enable his patients to avoid disease, to prevent them from becoming dangerous to others, are not the least important parts of his occupation. Education alone, in addition to intelligence and honesty, can enable him to promote these aims.

The practice of Massachusetts courts in medical cases during the greater part of the present century was based on the decision of Chief Justice Parsons in 1809,[1] that if the patient's death

[1] Commonwealth *v.* Samuel Thomson, 6 Mass. Rep., 134.

is the result of treatment honestly administered, the person prescribing is not guilty of manslaughter. It is only within the past ten years that this decision has been reversed[1] by the declaration of Judge Holmes that one who practises with reckless ignorance or negligence is liable for homicide, and for civil damages if he causes injury by ignorant or unskilful practice.

The number of cases of death due to the gross ignorance or negligence of the charlatan is unknown. Some are probably familiar to many members of this Society. I merely allude to the statement of the court that Thomson, who gave his name to Thomsonianism, without reasonable doubt caused the death of his patient by unskilful treatment. That Franklin Pierce was the cause of his patient's death by ordering the application of flannels saturated with kerosene oil for some three days. That a barber in Illinois, by the unscrupulous methods of the quack, obtained a considerable practice, and caused "the brutal butchery of a mother in labor and her unborn offspring."[2]

Other instances, occurring in his own experience, are mentioned by the medical examiner for Suffolk County, Dr. F. W. Draper, in his argument before the Public Health Committee of the Legislature, Feb. 14, 1894.

Dr. F. B. Harrington of Boston informs me of a poor woman who was suffering from copious and continuous hemorrhages from uterine cancer. These

[1] Commonwealth *v.* Franklin Pierce, 138 Mass. Rep., 165.

[2] Rep. State Board of Health, Ill. 1884, VI., 10.

were controlled in accordance with his advice. She later came under the care of a Christian scientist, who told her there was nothing the matter, and that she might go out and pursue her daily occupation. The bleeding returned, but the advice to go about was persisted in. A hemorrhage took place while she was away from her home and caused her death shortly after her return. Similar illustrations of death following the gross ignorance of persons claiming to cure disease might be produced almost without limit, and the existing laws fail to prevent them.

But it is claimed, if the person is injured as a result of negligence or lack of skill, a suit for damages may be brought. As a rule such cases do not come to trial. Those which are brought before a jury are usually directed against educated physicians of means for various motives. The hospitals of every large city are constantly resorted to by unfortunates who have been induced to apply to ignorant and pretentious charlatans for medical or surgical aid, and have suffered grievous injury from following their advice. If the sufferer realizes the cause of his misfortunes, he may be unable to secure the services of counsel. If he should be successful in this effort he usually recovers nothing, since the charlatan either has no visible means, or leaves the State in time to escape an unfavorable verdict. Much more often he suffers in ignorance of the cause of his suffering.

Not only are the laws against manslaughter and malpractice insufficient to protect the community,

but those intended to guard against the spread of contagious diseases are alike ineffective. The ignorant pretender, under whatever title he or she may appear, often does not recognize the nature of the contagious disease. No suggestion is made of isolation. Well children are allowed to play with the sick. All are permitted to go to school, and the outbreak of scarlet fever or diphtheria is thus promoted, which could have been avoided by the intelligent precautions of an educated physician. I have before me the advertisement of a person employed in a street-car, announcing "Diphtheria cured in all stages." Cases were taken to him for treatment and were not reported to the Board of Health. The law concerning the notification of contagious diseases could not apply to this person, since he did not call himself a physician; neither was he a householder, and he could have pleaded ignorance of the nature of the malady. The cases under his treatment which were about to die were referred, at the last moment, to physicians who were then called upon to give such aid as was possible. Existing laws do not protect the community from such persons as these.

We are told that the legislation is not wanted, since the people do not ask for it. The history of medical legislation in the various States of the Union furnish direct evidence to the contrary. Appeals are made by clergymen, lawyers, authors, physicians and public-spirited men of every degree. Physicians, it is true, as a rule, take the initiative, since the evils resulting from the ignorance or lack

of skill of the pretender are usually first brought to their notice. The grievously sick or dying victims of the abortionist, the moribund patient deceived by the promises, or injured by the statement of the charlatan, eventually seek aid from the educated physician in good standing, often at a time when death is but a few hours removed, or permanent deformity has been made a necessity, or conditions often bordering upon insanity have been reached.

It is this experience of the doctors which has opened the eyes of the people, and it is the enlightened common sense of the latter which has decided upon the need of the regulation of the practice of medicine throughout nearly all the United States.

Finally, we are told that the State control of medical practice has proven a failure. At the present time some sort of law intended to regulate the practice of medicine exists in nearly every State and Territory of the Union. These laws differ widely in their scope and in their results; but all have the same end in view—the protection of the people. As some have failed to produce the desired result, suitable amendments have been made. Some of the most recent laws are those which promise to be the most efficient, and it would indeed be astounding were a series of failures likely to act in favor of a renewal of the same undertaking. On the contrary, the failure of the earlier attempts at medical legislation has led to the avoidance of the causes of failure, and the reports from various States give encouraging evidence of what has been accomplished.

The success of medical legislation in this country is now a matter of history; and it will be attempted to give a short sketch of what has been accomplished.

According to the researches of Dr. Joseph M. Toner,[1] the earliest legislation in the colonies relative to the practice of medicine was in Virginia in 1639. It appears that the charges of physicians and surgeons were so excessive

"that the hearts of divers masters were hardened rather to suffer their servants to perish for want of fit means and applications than by seeking relief to fall into the hands of griping and avaricious men; it be apprehended by such masters, who were more swayed by politick respects than Xian duty or charity, that it was the more painfull and saving way to stand to the hazard of their servants than to entertain the certain charge of a physitian or chirurgern, whose demands for the most part exceed the purchase of the patient."[2]

A few years later this act was revised for the purpose of making a distinction between the charges of "surgeons, apothecaries, or such as have only served apprenticeship to those trades, who often prove very unskilful in the art of a physician;" and of those who have studied physic in any University and taken any degree therein.[3]

In 1649 Massachusetts passed a law forbidding "phisitians, chirurgians, midwives, or others," presuming "to exercise or putt forth any act contrary to the knowne rules of arte," or exercising "any

[1] Contributions to the Annals of Medical Progress and Medical Education in the United States before and during the War of Independence, 1874.

[2] Hening's Statutes at Large, I, 316, 317.

[3] Hening, op. cit. IV., 509, 510.

force, violence or cruelty * * * * * no, not in the most difficult and desperate cases,—without the advice and consent of such as are skilfull in the same arte, etc. etc."[1] This law was also inserted in the Duke of York's laws enacted about 1665 for the government of the province of New York.

Dr. Toner's valuable article contains no evidence of further attempts at regulating the practice of medicine during the subsequent century. The number of carefully educated physicians was inconsiderable, quacks abounded, and of New York in 1753 it was stated:[2]

"That place boasts the honor of above forty gentlemen of the faculty, and far the greatest part of them are mere pretenders to a profession of which they are entirely ignorant." * * * * *

"The war resulting in the conquest of Canada and subjugation of the French in 1763 created a demand for skilled medical officers and aided in the training of American students. Many of the English medical staff remained for several years in the vicinity of New York, established military hospitals and aroused the ambition of the colonial practitioners."[3] * * * * *

"Although partial recognition of the profession and protection of the people had been secured in several of the colonies, and particularly in some of the larger cities, by legislation, the first well considered act regulating the practice of physic was that passed in New York, June 10, 1760, beginning as follows: 'Whereas many ignorant and unskilful persons in physick and surgery, in order to gain a subsistence, do take upon themselves to administer physick and practise surgery in the city of New York, to the en-

[1] Records of Massachusetts, 1854; III., 153.

[2] New York Independent Reflector, Toner, *loc. cit.*, 49.

[3] Davis, History of Medical Education. Toner, *loc. cit.*, 37.

dangering of the lives and limbs of their patients, and many poor and ignorant persons inhabiting the said city, who have been persuaded to become their patients, have been great sufferers thereby; for preventing such abuses for the future—

"'*1. Be it enacted,*'" *etc., etc.*[1]

According to this act no person was allowed to practise, under a penalty of five pounds and costs, who had not previously passed an approved examination in physic and surgery before one of his Majesty's council, the Judges of the Supreme Court, the Attorney-General and the Mayor for the time being, or any three of them, taking to their assistance for such examination such person or persons as they in their discretion shall think fit.[2]

Twelve years later a similar act was passed in New Jersey at the instigation of the New Jersey Medical Society, and was the first comprehensive, protective law applied to a colony, the legislation above mentioned applying only to the city of New York. The examination was approved of and admitted by "any two of the judges of the supreme court, taking to their assistance for such examination such person or persons as they in their discretion shall think fit."[3]

In the following year, 1773, the code of Virginia required every surgeon, physician and dentist to take out a license, which authorized the holder to practise anywhere in the colony. Neglect to procure a license was punishable by a fine of not less

[1] Toner, *loc. cit.*, 51.

[2] Trans. Med. Soc. State of N. Y., 1840–43, 12.

[3] Toner, *loc. cit.*, 52.

than thirty nor more than one hundred dollars, nor could such negligent practitioners collect compensation for services.[1] In the same year, in Connecticut, a law for the suppression of mountebanks was enacted,[2] although a year later the Lower House of Assembly in this colony negatived the memorial of Norwich physicians asking for the appointment of a committee legally authorized to examine and approve candidates if found qualified.[3]

The War of the Revolution now occurred. Dr. Toner[4] thinks it probable that at this time

"there were not living in all the colonies 400 physicians who had received medical degrees; and yet, as is stated elsewhere, there were presumed to be over 3,500 practitioners."

According to the same authority,[5] the war gave

"great impetus and energy to the whole population of the colonies. The experience gained by the medical men who served in the army elevated their views, gave them confidence in the exercise of their professional duties, endeared them to the public, and made them almost oracles in the communities in which they resided. This spirit of gratitude also created friends for the profession in the various legislatures, led to the enactment of laws which were more just and protecting in their character, and popularized the more recent and thorough modes for the scientific study of medicine."

In 1783 New Jersey was the first of the States to pass a law regulating the practice of medicine. It was followed in 1792 by New York, which de-

[1] Trans. Ill. State Med. Soc., 1881, XXXI., 256.

[2] Toner, *loc. cit.*, p. 70.

[3] Times and Register, 1893, XXVI., 1027.

[4] Toner, *loc. cit.*, 106.

[5] Toner, *loc. cit.*, 107.

manded of practitioners in the city and county of New York two years of study with a reputable physician, if the candidate was a graduate of a college in the United States, otherwise three years of study. Also an examination before the Governor, Chancellor, Judges of the Supreme Court, Attorney General, Mayor and Recorder of the city of New York, or any two of them who were to take to their assistance any three respectable practitioners with whom the examined person had not lived. The certificate of this board was a license to practise, and without it no legal demand could be made for services. Physicians who had regularly received the degree of Doctor of Medicine, those already in practice, and consulting physicians from neighboring States or counties were exempt from the provisions of this law. The above, somewhat modified, was made, in 1797, the general law of the State.[1]

In 1798 power was given to the Medical and Chirurgical Faculty of Maryland to grant licenses "upon full examination or upon the production of diplomas from some respectable college." The penalty for practising without a license was $50.00 for each offence.[2]

During the first forty years of the present century, legislation, with a view to regulate the practice of medicine, was frequent and various. The initiative was taken by those desirous of protecting the people from ignorance, lack of skill and ex-

[1] Trans. Med. Soc. State of New York. 1840-43. 12.

[2] Quinan, N. Y. M. R., 1886. XXIX., 505.

tortion; and the opposition came from quacks and pretenders of every kind.

New York, in 1806, incorporated medical societies for the purpose of regulating the practice of physic and surgery, following the example set by Massachusetts, and which proved so successful in that State after the amendments adopted by the Massachusetts Medical Society in 1804. In 1808, a few years after the territory of Orleans was set off from the Louisiana purchase, a bill was enacted by the territorial government, stating "that no person shall presume to practise medicine" without an examination, for which a diploma from some university or school was a qualification. This law was amended in 1816, and was enacted as the law for the State of Louisiana.[1]

From this time on, State after State passed some form or other of a law for the prevention of quackery. And it is stated by Senn[2] that during the first half of our national existence every State had enacted such laws, with the exception of Pennsylvania, North Carolina and Virginia.

These laws, however, did not long remain operative; they were premature in many instances, there not being enough educated physicians to provide for the needs of the people. Quacks thus found their way into the remoter sections of the State, and their presence and assertions were welcomed by the sick and infirm. They practised in defiance of the law. Whereas, now, unlicensed practi-

[1] Chaillé, N. O. M. & S. J., 1877–78. N. S. 5. 909.
[2] Trans. Wis. State Med. Soc. 1879. XIII.

tioners are declared exempt from the penalties of the law in States like Arizona and Idaho, when there is no licensed physician living within a convenient distance of the patient. Quackery spread from the remoter districts towards the centres of population, became more and more popular, and excited the more sympathy the more it was opposed. The difficulties in the way of enforcing the laws became greater. Juries refused to convict, officers of the medical societies neglected to bring charges, and finally the laws were so amended as to exempt all quacks, mountebanks and charlatans from the penalties. This result attained, the laws became useless, and in certain States were effaced from the Statute Book.

The first serious blow to the regulation by the State of the practice of medicine was the result of the spread throughout the country of the doctrines of Samuel Thomson, who died in 1843. He was an illiterate farmer of New Hampshire, an empiric of the first water, but distinctly a remarkable man. He denounced the heroic treatment then in vogue by means of bleeding, mercurials and mineral medicines in general, and advocated the use of certain vegetable agents whose value he claimed to have discovered. He stated that he was in the habit of tasting herbs and roots, and was thus enabled to ascertain what were useful for any particular disease. In his "Narrative,"[1] first pub-

[1] A Narrative of the Life and Medical Discoveries of Samuel Thomson, etc. 8th Ed. 1832.

lished in 1822, he announces as his general plan of treatment :

"to cleanse the stomach by giving No. 1, and produce as great an internal heat as I could by giving No 2, and when necessary made use of steaming, in which I have always found great benefit, especially in fevers; after this I gave No. 3, to clear off the canker; and in all cases when the patient had not previously become so far reduced as to have nothing to build upon, I have been successful in restoring them to health."

No. 1 consisted of lobelia; No. 2 of red pepper; and No. 3 of a variety of herbs, including rosemary, bayberry, myrtle, sumac or raspberry, although he states that a great many articles were "useful in removing canker."

In 1809 he was tried for the murder of one of his patients.[1]

"*As the learned Judge could find no law, common or statute, to punish the accused, he directed or advised those present to stop this quackery, as he called it, and for this purpose to petition the Legislature to make a law that should make it penal for all who should practice without license from some medical college to debar them of law to collect their debts; and if this should not answer, to make it penal by fine and imprisonment.*

"This hint, thus given by the judge, was seized upon first in Massachusetts; from thence it has spread to nearly all the States of the Union. From this source may be traced all those unconstitutional laws which have been enacted in relation to this subject, and all those vexatious suits which I have had to attend in many of the States, from Massachusetts to South Carolina, more or less almost every year since. But I have been able to break them down by my patent being from higher authority, which Judge Parsons could not prevent, or perhaps he never thought of. He, however, made his own report, and handed it to the re-

[1] *Op. cit.*, p. 167.

porter, which is published in the sixth volume of Massachusetts Reports, and is resorted to by all the enemies of the practice for a defence against the system."

He afterwards brought suit against his principal accuser, Dr. French, which came to trial, again before Chief Justice Parsons, in 1811.[1]

"The judge then gave his charge to the jury, which was considered by those who heard it, to be the most prejudiced and partial one that they had ever heard. He made use of every means to raise the passions of the jury and turn them against me; stating that the defendant was completely justified in calling me a murderer, for if I was not guilty of wilful murder, it was barbarous, ignorant murder; and even abused my lawyers for taking up of me, saying that they ought to be paid in screw augers and bull dogs."

The jury brought in a verdict for the defendant.

In 1813 he obtained a patent to secure to him the exclusive right of his system, and to put him above the reach of the law in any State. But in 1821 Judge Story decided that its specifications were improperly made out, and in 1823 a new patent was obtained.[2]

"The preparing and compounding the foregoing vegetable medicines, in manner herein described, and the administering them to cure disease, as herein mentioned, together with the use of steam to produce perspiration, I claim as my own invention."

The simplicity of the theories of disease and its treatment, the use of simples, always commending itself to the popular mind, and the notoriety attained by numerous law suits, all served to attract attention to Thomson's doctrines. Many editions of his writ-

[1] *Op. cit.*, p. 176.

[2] *Op. cit.*, p. 243.

ings were published, and agents were employed to travel through the States, selling with the book and medicines a family right to practise for $20.00. "Friendly Botanic Societies" were established, the membership being composed of those who had purchased family rights, and the privileges in which are stated by him as follows:[1]

"Every one who purchases a right for himself and family, becomes a member of the Friendly Botanic Society, and is entitled to all the privileges of a free intercourse with each other, and to converse with any one who has bought a right, for instruction and assistance."

Thomson's doctrines were especially favored in the eastern section of Massachusetts, and along the adjacent borders of Maine, New Hampshire and Vermont.

After the publication of his "Narrative" and the employment of agents, he and they travelled extensively in the South and West. Although they were unlicensed practitioners in most States, the laws had no penalties sufficient to prevent them from practising. His followers succeeded in securing the enactment of laws by which no person was to be debarred from using or applying for the benefit of the sick person any roots, barks or herbs, the growth or produce of the United States. At first the proviso was added, that they should be unable to recover by process of law any debt incurred from such practice. This objection was easily met by obtaining fees in advance. The restriction was of greater value to them for advertising pur-

[1] *Op. cit.*, p. 220.

poses in creating sympathy, and we learn[1] that "thousands have had their sympathies enlisted in their behalf; have come to believe their senseless clamor, and had their prejudices aroused against the medical profession." Finally, medical schools, called "eclectic," were established by those who were willing to take advantage of Thomson's success, adopting his practice, but avoiding his interference.

Thomsonianism prepared the way for the success of homœopathy, which proved to be the more effectual agent in annulling the licensing of physicians. In the words of Dr. J. W. Hamilton[2] "It swaggered on the stage long enough to give a wholesome check to the excesses that brought it into being, and proved itself the bloodiest murderer that ever visited our too credulous community in the form of quackery."

In certain respects homœopathy bore a close resemblance to Thomsonianism. It represented a reaction from the heroic treatment of the regular physicians, it offered a few remedies, although in palatable form, with such specific and authoritative directions that the family provided with pellet and pamphlet had but little need of the educated physician. Its leaders, however, came from the ranks of the latter, and its followers were to be found among the more intelligent, prosperous and influential members of society. Its adherents increased in numbers in the cities and larger towns,

[1] Trans. Med. Soc., State of N. Y., 1844–49, VI., 46.

[2] Trans. Ohio State Med. Soc., 1867; 36.

and it throve upon the opposition it encountered from members of the regular profession. Like Thomsonianism, it called for sympathy on the ground of intolerance and persecution on the part of licensed physicians, and Thomsonianism and homœopathy combined succeeded in so emasculating existing laws regulating the practice of medicine that they became useless, and their removal from the statutes was often sought by all alike.

In 1838 Maryland made it lawful for every citizen of the State to charge and receive compensation for his services and medicines. In the following year Georgia passed a revised medical act, in which it was "provided nothing be so construed as to operate against the Thomsonian or botanic practice or any other practitioners of medicine in this State."[1] A few years later, in 1847, it established a Botanico-medical board, with the same powers and duties as the regular board.[2] In New York, in 1844, a bill was enacted, of which Judge Beardsley said: "Since the passage of the act of 1844 quackery may certainly boast its triumphant establishment by law."

At the close of the first half of the present century there were practically no efficient laws controlling the practice of medicine by the licensing of physicians in this country. The history of such legislation in Massachusetts from the War of the Revolution to that of the Rebellion has been

[1] Trans. Med. Soc. State of N. Y., 1844-49, VI., 45.

[2] So. M. & S. J., 1866-7, 3d S. I., 456.

given elsewhere.[1] Existing laws had either been repealed or were not enforced, and the regularly educated physicians had ceased in their efforts to suppress quackery by attempting any legislative prohibitory enactments. They were largely responsible for this result. With the best of intentions throughout these fifty years, they failed to read aright the signs of the times, and by errors of omission and of commission they rather aided the progress of quackery than checked its growth.

With the incorporating of medical societies by the State, the licensing of physicians was placed in their hands. Examining boards were established and candidates were to appear before them. But in some States these boards were so few, and the members lived so far apart, that the examinations were not held. Such evasions of the law made it easy for a rejected candidate to obtain a special act of the legislatnre allowing him to practise. In case of rejection by one board he might appear before another less exacting. If all the boards in any one State were too stringent, it was possible for the candidate to obtain a license in another State, where the terms were less rigid, or by mere payment of the registration-fee. A license thus obtained was usually valid in other States. If he practised in violation of the law, it was the duty of no one to bring suit. Although the licensing power was transferred by the State to the medical societies, members of the latter were unwilling to act as accusers and prosecutors from the demand

[1] The President's Address, Trans. Assoc. Am. Phys., 1894, IX.

it made upon them for time and money, and the necessity it placed them under of assuming a disagreeable and opprobrious task. Even if cases were brought to trial conviction was difficult, since the penalty was so severe that the jury was unwilling to condemn what it was told was essentially a difference of opinion.

What must be regarded as their chief mistake was the treatment of their homœopathic brethren. Irrespective of all questions of ethics it was a decided and decisive error of policy. The latter were educated physicians, certainly as honest as many of their associates, whatever may be said of their intelligence. Their expulsion and ostracism created two powerful opponents, largely representing two distinct classes of society, but united in their efforts to resist repression. The botanic, eclectic and physio-medical practitioners (the offshoots and successors of Thomsonianism) and the homœopathists, as they increased in numbers and strength, were, combined, enabled to secure the repeal of all restrictive legislation. They became exempted by law from the need of a license, and the regular physician saw no necessity for paying the fee for a license which placed him in no different light before the public than the quack. As the irregulars formed chartered medical societies with the same privileges as those possessed by the regular societies, members of the latter in many states became active in securing the repeal of laws which proved of no value to the community. Eclectic and homœopathic medical schools were estab-

lished, and the name of physician and the title of doctor of medicine no longer became of the least value in acquainting the public with any distinction between the educated practitioner and ignorant pretender, and no check whatever was placed on the increase of the latter.

An interval of some twenty years now elapsed, during the first half of which the state medical societies were perfecting their organization with the view of maintaining a high standard of membership. A certain degree of uniformity in this action was the result of the formation of the American Medical Association in 1847. The annual meetings of this organization brought together representative men from the various state societies, most of whom had been actively interested in the legislative control of medical practice. They endeavored to improve the standard of medical education and the ethics of the regular profession throughout the country. The war of the Rebellion created a sudden and extensive demand for educated physicians and surgeons, their numbers speedily increased, and the subsequent rapid growth of the country has continued this increase. The brilliant progress in the various specialties of medicine made more apparent the distinction between the educated and skilful physician and the ignorant but pretentious quack. Homœopathic and eclectic medical schools were paying more attention to the instruction of their students, and the line was thus being more sharply drawn between practitioners of no training and those who had received some

teaching. All educated physicians, whatever their degree of instruction, were interested in defending the community from mere pretenders, and their combination has led to the successful medical legislation of the past twenty-five years.

Since the law recognizes no distinction between regulars, homœopathists and eclectics, on the contrary, the legislators have given like privileges to each, by incorporating them into medical societies and medical schools, it became obvious that if any legislation was to be secured against the worst forms of quackery, it must be obtained by the practical agreement of these incorporated medical bodies. The numerous experiments which have been made in the various states during the past twenty-five years, and which have led to the enactment of licensing laws in nearly all the states and territories, have been the result of this harmony of action.[1] It has been justified not only by the needs of the community for protection, but also by the fact that both homœopathists and eclectics represent a kind of practitioner whose education is constantly improving. Homœopathists, in particular, have been, from the beginning, physicians of a certain, and at times of a considerable degree of education. They are honestly and earnestly en-

[1] For much of the information relative to the provisions of the laws in the various states and territories, I am indebted to the admirable Synopsis of the existing Statutes, prepared by William A Poste, late deputy attorney-general of the state of New York, and Charles A. Boston, Esq., of the New York City Bar, for the text book of Medical Jurisprudence, Forensic Medicine, and Toxicology, of Witthaus and Becker, just published. By the aid of our librarian, Dr. E. H. Brigham, I have been enabled to obtain from the respective officials of many of the states copies of the medical licensing laws of these states, and take this opportunity of expressing my thanks to all concerned.

deavoring to improve their educational facilities, and some of the eclectic schools are following in their foot-steps.

In 1872, a bill was prepared under the auspices of the New York Medico-Legal Society, and was favorably acted upon by the legislature, but was subsequently vetoed by the governor.[1] This unsuccessful attempt was followed in 1873 by the passage of a law in Texas, requiring the registration of diplomas by all practitioners entering the state. It was repealed and replaced in 1876 by an act establishing boards of examiners, who were to examine all applicants for certificates of qualification without preference to any school of medicine. This law, to-day, in the words of Dr. West of Galveston, "is practically inoperative, as but few boards are organized, and about most that any of them do is to license non-graduates."

In the District of Columbia in 1874 it was the duty of every physician to register at the office of the board of health, under penalty of from $25.00 to $200.00. This regulation was legalized by Congress in 1880. All physicians required to register must do so upon a license from some chartered medical society, or upon a diploma from some medical school or institution.

The law of Nevada, enacted in 1875, makes a lawful practitioner one who has received a medical education and a diploma from some regularly chartered school having a *bona fide* existence when the diploma was granted. The county recorder accepts the diploma.

[1] N. Y. M. J., 1874, XX., 64.

In 1877 a law was passed in Alabama according to which a license or diploma, or certificate of qualification, was essential to the lawful practitioner. If he wished to practise any irregular system, he was obliged to pass an examination in anatomy, physiology, chemistry and the mechanism of labor before the Censors of the Medical Association of the State of Alabama, or of some affiliated County Medical Society. This Act was replaced by that of 1887, which was amended in 1891, and according to Dr. Cochran of the Board of Censors is

"almost ideally perfect. If the State would invite us to change it according to our wishes, we would not know what change to suggest. All we have to ask of the State is simply to let our law stand as it is and enforce it in the courts. * * * * We have a very few homœopathic practitioners in Alabama, but a considerable number of doctors who, graduated in eclectic schools, have availed themselves of the advantages we have to offer them, and have become good working members of our organization." [1]

In the same year Illinois passed its first law, which was amended in 1887. It is unnecessary to enter into the details of medical legislation during the next fourteen years. It is merely to be stated that laws were passed as follows:

Year.	*State or Territory.*
1880.	Vermont.
1882.	Georgia, Rhode Island.
1883.	Maine, Michigan, North Carolina.
1884.	New Mexico.
1885.	Indiana.

[1] Dunglison, Coll. & Clin. Rec., 1890, XI., 11.

1886. Iowa.
1887. California, Idaho, Minnesota, Virginia, Wisconsin, Wyoming.
1888. Tennessee.
1889. Delaware, Kansas, Missouri, Montana, Oregon.
1890. New Jersey, North Dakota, Ohio, South Carolina, Washington.
1891. Colorado, Nebraska, West Virginia.
1892. Florida, Maryland, Mississippi, Utah.
1893. Arkansas, Arizona, Connecticut, Kentucky, New York, Oklahoma, Pennsylvania, South Dakota.

Thus, at the present time, there are laws intended to regulate the practice of medicine to a greater or less extent in all the States of the Union, except in Massachusetts and New Hampshire.

The requirements of these laws vary within very wide limits. Rhode Island merely demands that the name and residence shall be recorded in the town clerk's office. In Maine and Wisconsin the physician cannot recover compensation unless he has a medical degree from a public medical institution in the United States, or a license from the State Medical Association, or, in Maine, a certificate of good moral character from the town authorities. The simple registration of the diploma or license suffices in Arizona, the District of Columbia, Georgia, Idaho, Indiana, Kentucky, Louisiana, Michigan, Nebraska, Nevada, South Carolina, South Dakota, and Wyoming. The possession of a

diploma or a certificate of qualification from a State or County Medical Society is sufficient in Kansas and Ohio.

The diploma must be verified by boards of examiners in California, Colorado, Connecticut, Delaware, Iowa, Montana, New Mexico, Oregon, South Carolina, Tennessee, Vermont; by boards of health in Illinois, Kentucky, Louisiana, Missouri, Nebraska, Oklahoma, South Dakota, West Virginia. They are only approved when representing certain periods of study in Maryland, Minnesota, Montana, Nebraska, New York, New Jersey and North Dakota.

Candidates who have no diploma are required to pass an examination in Alabama, Arkansas, Colorado, Connecticut, Delaware, Missouri, Montana, New Mexico, North Carolina, Oklahoma, Illinois, Iowa, Oregon, Tennessee, Texas, Utah, Vermont, Virginia, West Virginia.

Examinations are the sole qualification for license in Florida, Maryland, Minnesota, Mississippi, New Jersey, New York, North Carolina (except for graduates prior to 1880), North Dakota, Pennsylvania, Utah, Virginia and Washington.

The effect of these laws also is extremely various. In Arkansas, California, Florida, Georgia, Ohio, South Carolina and Texas the laws are said to be either unworthy of the name, contain glaring defects, are of low standard, unsatisfactory or practically inoperative. Even in North Carolina the law is defied with impunity. On the contrary in Alabama, Minnesota and Virginia, the laws are

almost ideally perfect. In New York the promise has been more than fulfilled. More and more support is being given to the law in West Virginia, while in Illinois, Indiana, Iowa, Kentucky and Missouri the laws are efficient, salutary, working well, or meeting with general favor. In New York the number of physicians entering practice has been diminished, and the quality has been improved. Of 327 candidates in 1892, 267 fulfilled the requirements, of whom 244 were regulars, 17 homœopathists and six eclectics. In Indiana 559 practitioners left the State; in Kentucky 400 or 500, and 250 in Minnesota, during the year 1885.

A conspicuous effect of these laws has been seen in the improvement of the standard of medical education. To them, more than to any one cause, is due the difference which exists between the condition now and in 1870. In Alabama, Colorado, Connecticut, Illinois, Nebraska, Oregon, South Dakota and Washington, at least three full courses of five to six months each, no two in the same year, are demanded. The State of Oregon, after 1898, will require four courses of six months each from physicians who wish to practise in that State. There is not only a prolongation of the period of study as the effect of these laws, but there is also an increased demand for a preliminary education, the establishment of new professorships, and more exacting examinations for the degree. Of all agents distinctly bringing about this change, the Illinois State Board of Health, and especially its secretary, the late Dr. John H. Rauch, deserve the highest consideration.

Let us now consider the recent efforts in Massachusetts. In the address, previously referred to,[1] it is stated that all laws relating to the licensing of physicians by the State of Massachusetts were stricken from the statutes in 1859. The influence of the homœopathists in bringing about this result was obvious, but a number of them still retained their membership in our society. They were inoffensive, but the feeling against homœopathy was so strong in the minds of certain members that, in 1870, a protest was made by some of the latter against the admission to the American Medical Association, then meeting in Washington, of delegates from the Massachusetts Medical Society. The Association voted, in effect, "that the Massachusetts Medical Society voluntarily and improperly furnishes shelter and gives countenance to irregular practitioners to such an extent as to render it unworthy of representation in the General Assembly of American Physicians." [2]

At the annual meeting of our Society, May 24, 1870, the following vote, "amid much confusion," was passed:

"*Resolved*, That the Massachusetts Medical Society hereby expels from fellowship all those who publicly profess to practise in accordance with any exclusive dogma, whether calling themselves homœopaths, hydropaths, eclectics, or what not, in violation of the code of ethics of the American Medical Association." [3]

This vote, however, had no legal force, since no member could be expelled except after a trial in

[1] Page 307.

[2] Proc. Mass. Med. Soc., 1871, 204.

[3] Proc. Mass. Med. Soc., 1870, 159.

conformity with the by-laws. But Dr. Cotting, at the Councillors' meeting, June 6th, 1871, offered the following preamble and resolutions, which were adopted by the Council, and on the following day by the society:

"*Whereas*, The Massachusetts Medical Society has always endeavored to make, as its charter emphatically enjoins, '*a just discrimination between such as are duly educated and properly qualified for the duties of their profession and those who may ignorantly and wickedly administer medicine*,' while at the same time it has ever acted in accordance with the 'liberal principles' of its foundation, and shows itself ready to examine and to adopt every suggestion, from whatever source, promising improvement in the knowledge and treatment of disease;

"*And, whereas*, It is alleged that some of its Fellows, in opposition to the spirit and intent of its organization, consort, in other societies or elsewhere, with those whose acts tend 'to disorganize or to destroy' the Society;

"*Therefore, resolved*, That if any Fellow of the Massachusetts Medical Society shall be or shall become a member of any society which adopts as its principle in the treatment of disease any exclusive theory or dogma (as, for example, those specified in Art. I. of the By-laws of this Society), or himself shall practise, or profess to practise, or shall aid or abet any person or persons practising, or professing to practise according to any such theory or dogma, he shall be declared to have violated the By-laws of the Massachusetts Medical Society by 'conduct unbecoming and unworthy an honorable physician and member of this Society.' By-laws, VII., § 5.

"*Resolved*, In case the Society concur with the Councillors in the foregoing resolution, that the President of the Society shall appoint a committee of five Fellows (to hold office one year and until others are appointed) to bring before a Board of Trial any Fellow who, three months from this date or after, shall be found chargeable with the offence set forth in the foregoing resolution.

"*Resolved*, That, after concurrence by the Society, the foregoing preamble and resolutions shall be printed, and a

copy sent to every Fellow of the Massachusetts Medical Society.

"*Resolved*, That a committee of three be appointed by the chair to report the action of the Councillors on the foregoing preamble and resolutions to the Society, to-morrow, for concurrence." [1]

A board of trial was appointed; it reported in 1873, 1875 and in 1877, in each of which years a certain number of the homœopathic members were expelled until all were thus disposed of.

In the meantime, as already stated, successful efforts were being made to secure the legislative control of medical practice in various states. Their success depended upon the recognition of the principle that no attempt should be made to interfere with the chartered rights of existing medical societies. The action of our society towards its homœopathic members was based on the view that their "conduct was unbecoming and unworthy an honorable physician." It, therefore, could not, then, consistently unite with the homœopathic society in favoring a law which should place both on the same level.

But the need of discriminating between educated and honorable physicians and the reverse was strongly felt by individual members of the society, and the earlier attempts at securing legislation were made by them.

In 1877 a bill[2] was introduced by Mr. Ewing of Hampden, and was entitled "An act to regulate the Practice of Medicine and Surgery in the State

[1] Proc. Mass. Med. Soc., 1871, 201-216.

[2] Senate, No. 46.

of Massachusetts." It provided that each and every existing chartered medical society shall elect censors, with authority to examine and license practitioners of medicine, surgery and midwifery. The license was to be valid for a year only, and was to be furnished on presentation of a medical diploma or satisfactory certificate of examination from an authorized board. The certificate of license was to be recorded by the county clerk, and might be revoked for cause. The penalty of practising without a certificate was from $50.00 to $100.00 for the first offence, from $100.00 to $400.00 for any subsequent offence, and fees for services rendered could not be collected by law.

This bill was intended to prevent the practice of medicine by uneducated persons, without, however, establishing any common or definite standard, and required merely the verification of certificates. It was referred to the Committee on the Judiciary, who reported against the bill,[1] and it was rejected. A month later another bill, relating to medicine and pharmacy, was presented, and was referred to the next General Court.[2]

In the following year the same bill was again brought before the Senate,[3] and was referred to the Committee on Water Supply and Drainage. They reported, Feb. 20, 1878, that it ought not pass, and it was rejected. A similar bill[4] "to regulate the Practice of Medicine and Surgery in

[1] Senate, No. 119.
[2] Senate Journal, 1877, 255.
[3] Senate, No. 67.
[4] House, No. 86.

the City of Boston" was also referred to the Committee on Water Supply and Drainage. The clause relating to the inability to collect fees by law was omitted. It was expressly stated that veterinary surgeons, exclusive practitioners of the Thomsonian or botanic system of medicine, clairvoyants or healing mediums, not assuming the title of doctor, physician, surgeon or midwife, persons practising gratuitously, and those not occupying an office or place of business for the practice or advertisement of medicine, surgery or midwifery in the city of Boston, were exempt from its provisions.

The practical effect of this bill was to limit the use of the title of doctor, physician, surgeon or midwife to persons of some degree of education, but the difference in standard might be extreme. It was less restricting than its predecessor. The committee reported leave to withdraw, but a minority recommended its passage. This bill also appears as House, No. 122, submitted in reply to a petition from the mayor of Boston, for an order relative to regulating the practice of medicine and pharmacy in the city of Boston. The same minority, as before, of the Committee on Water Supply and Drainage, recommended its passage, but leave to withdraw was voted, March 15, 1878.

In 1880, Governor Long, in his inaugural address, stated that the necessity of protecting the community against medical impostors had been urged upon his attention, and he referred it to that of the legislature. At this time the health department

of the American Social Science Association had its headquarters in Boston, and a number of the younger Fellows of the Massachusetts Medical Society were among its members. Through their initiative, a powerful effort was made in the name of the above association to secure a law to regulate medical practice. Dr. E. W. Cushing of Boston, at a meeting of the Suffolk District Medical Society early in the year, explained[1] the steps which had been taken and the provisions of the bill. He stated that it had been prepared after consultation with eminent lawyers and representative physicians. The experience of other states had been utilized in its preparation, and the final draft met with the approval of the leaders of the homœopathic and eclectic medical societies. It was supported by eminent citizens of Massachusetts in Boston and elsewhere. It provided for the appointment, by the Governor and Council, of a board of medical registration composed of eight physicians and one dentist. The former were to be selected from the incorporated medical societies of the State in proportion to the whole number of members in each. This board was to examine, in medical subjects exclusive of therapeutics, applicants for a license to practise medicine, dentistry or midwifery. All members of the state medical societies incorporated at the time of the passage of the act were to be exempt from examination. Also all practitioners in the state, of one year's standing, having an approved diploma or license;

[1] Boston M. and S. J., 1880, CII., 180.

all practitioners of good moral character and reputation having practised in the state for ten consecutive years; non-resident practitioners with an approved degree or license, and students of incorporated schools rendering gratuitous services. Licenses could be refused or revoked for cause. The penalty for practising without a license was a fine not exceeding five hundred dollars.

This bill was referred to the Committee on Public Health, which held six hearings, and reported "An Act relating to Practitioners of Medicine,"[1] providing that persons offering or advertising to practise medicine, surgery or midwifery, without a reasonable degree of learning, skill and diligence therein, shall be fined not exceeding five hundred dollars. Another provision was that persons professing to heal or cure disease in whatever manner, shall not assume the title of doctor, or of doctor of medicine, without having received the degree of doctor of medicine from a reputable chartered medical institution, under penalty of a fine not exceeding five hundred dollars. There were exempt from this provision persons who had used the title for ten years in the state, and members of any medical society of the state lawfully exercising the power to examine and approve its members before admission.

The bill was rejected by a very large majority in the House. This attempt of the Social Science Association to protect the community against medical impostors was defeated, according to

[1] Senate, No. 198.

Dr. Granger,[1] largely because of counter-petitions and complaints that the law was intolerant and exclusive, for the benefit of the few, and an interference with the rights of the many. The opposition was determined and powerful. It comprised some of the oldest and most honored physicians, many educated and intelligent citizens, all the quacks and their friends, and was supported by many newspapers, and advocated by eminent counsel.

In 1882, Governor Long, in his veto of the bill to "regulate the practice of dentistry," stated: "It would perhaps be better worth while to consider the expediency of a general statute to the effect that any person pursuing a business or profession without sufficient skill therein shall be punished. Such a statute, in the hands of judge and jury, would never work injustice, and yet would be ample for those exceptional cases of imposition, on the strength of which vicious special statutes are urged from year to year."

This suggestion from Governor Long was in harmony with the provision of the bill of 1880. It was eminently necessary in the practice of medicine, since, at that time, the ruling of Chief Justice Parsons in the case of the Commonwealth *v.* Samuel Thomson was generally held to be sound law. As has already been stated,[2] this ruling was replaced in 1884 by that of Judge Holmes. It was urged by Mr. Benton, in his argument before the

[1] Buffalo M. & S. J., 1880-1, XX., 97.

[2] Page 291.

Committee on Public Health in 1885, against the petition of the Massachusetts Medical Society for a law to regulate the practice of medicine, that the latter decision made further legislation unnecessary. He says:

"The present law is clear and ample. A man or woman who assumes to practise the healing art, impliedly contracts that he or she has sufficient skill and knowledge to do the thing which they assume to do, to cure the disease which they assume to treat, and no other. And if he or she does not have it, they are liable in damages for all the consequences that result from the lack of knowledge and skill. If he or she is grossly or presumptuously ignorant and negligent, and a person is thereby killed or injured, he or she is liable for manslaughter or for assault."

Even with this interpretation of the law, the security to the public is insufficient. As has already been shown, the cases of imposition are not so exceptional as assumed by Governor Long, neither is the victim nor his or her friends always conscious of it or competent to judge of the skill or knowledge of the medical adviser. None are more aware of the defenceless state of the public in these respects than physicians.

The next attempt was made in the name of our Society. In June 1884, on motion of Dr. H. O. Marcy, it was voted[1] that a committee be appointed by the President of the Massachusetts Medical Society to secure, if possible, an act to protect the people from ignorant and incompetent practitioners of medicine. A committee of sixteen was appointed, Dr. Townsend of Natick being the chair-

[1] Proc. Mass. Med. Soc., 1884, 68.

man. This committee was subsequently strengthened by the addition of Drs. G. C. Shattuck, Cotting, Lyman, H. W. Williams and Hosmer, as a special committee to aid that of the Society in its petition.

A hearing was given, lasting four days, was largely attended, and excited much public interest. It was shown as probable that there was in Boston, at the time, "greater ignorance and criminality, disguised under the name of the profession, than in any other city of the Union. Even houses of ill-fame are covered under the name of a physician."[1]

The committee reported[2] June 3, 1885, "an Act to regulate the Practice of Medicine," but one member dissenting. It provided for a board of nine examiners, not more than four to belong to the same medical society or school of medicine, who were to register as qualified physicians all graduates of legally chartered medical colleges or universities having the power to confer degrees; also all practitioners of medicine of ten years' continuous practice in the State. All other applicants for registration were to be examined, and at the close of a year all applicants whatsoever were to be examined. The examination was to be elementary and practical, and to embrace the subjects of anatomy, surgery, physiology, chemistry, pathology, obstetrics and the practice of medicine, exclusive of therapeutics. Persons practising

[1] Dunglison and Marcy, Coll. & Clin. Record, 1885, VI., 225.

[2] House, No. 445.

medicine or surgery without being registered were liable to a fine of not less than fifty nor more than five hundred dollars.

The bill was refused a third reading in the House by an overwhelming majority. According to the Boston Medical and Surgical Journal,[1] despite the origin of the movement at the annual meeting of the Society, and its advocacy, both by a general and special committee, "the sentiment of the great majority of the Society was one of entire indifference. But a small portion thought it worth while to put themselves on record at all."

Dunglison and Marcy state:[2] "It was presented during the last hours of a heated, long drawn out political contest, when time could not be given for its proper consideration, and, loaded down with amendments offered for its destruction, it failed of passage."

Four years later the attention of the legislature was again called to this subject through the labors of Dr. J. Frank Perry, at the time editor of the Journal of Health. The draft of the bill then presented[3] required that licenses to practise should be given by the Board of Health to medical graduates of legally chartered colleges, to members of at least one year's standing of incorporated medical societies, and to practitioners who had been in practice for ten years. All other applicants were to be examined by the censors either of the

[1] 1885, cxii., 203.

[2] *Loc. cit.*

[3] N. Y. Med. Jour., 1889, XLIX., 195.

Massachusetts Medical Society, the Homœopathic Medical Society or the Eclectic Medical Society, and the Board of Health was to license the successful candidates. Violation of the law was punishable with a fine not exceeding $500.00, or imprisonment not exceeding six months. Three petitions were presented in favor of the object of this bill, and twenty-six against it.

The subject was referred to the Committee on the Judiciary, who reported, May 23, 1889, a bill[1] entitled "An Act to Regulate the Practice of Medicine and Surgery." It provided that practitioners should file an affidavit of their qualifications with the city or town clerk, who should give a certificate stating the substance of the facts set forth in the affidavit, which certificate was to be conspicuously displayed in the practitioner's office. Violation of the provisions of this act was to be punished by a fine not exceeding one thousand dollars, or imprisonment not exceeding one year, or by both fine and imprisonment.

This bill was sent up for concurrence by a vote of eighty-two to fifty-nine, and was defeated in the senate. Dr. Perry informs me that he used every effort to defeat this bill in the senate, since he was determined to obtain a good bill or none at all.

In 1890 the attention of the legislature was again called to the subject by Dr. George S. Wilson of Boston, representing the Working People's Aid Society, and other working men's organi-

[1] House, No. 487.

zations. The matter was referred to the Committee on the Judiciary, who reported it inexpedient to legislate.

In the following year Dr. Wilson succeeded in obtaining a hearing before the Committee on Public Health, and presented the draft of a bill "to establish the registration of Medical Degrees." No one was to use the title of "Doctor," or of "Doctor of Medicine," or any abbreviation thereof, unless possessing a diploma from some reputable college or institution legally empowered to confer the degree. At the end of the year, after the passage of the act, no medical college was to be considered reputable which required less than three years of medical study and three annual courses of lectures of not less than twenty weeks each. The penalty was a fine of $50.00 to $200.00 for the first offence, and from $100.00 to $500.00 for each subsequent offence, or imprisonment from thirty to ninety days, or both fine and imprisonment.

The committee reported March 24, 1891, a bill[1] entitled: "an act to regulate the Practice of Medicine by the Registration of Practitioners," the provisions of which were similar to those of the bill reported in 1889. This bill was returned to the committee, slightly amended, and again reported April 7, 1891.[2] Dr. Wilson states that, in his opinion, the bill was so unsatisfactory to the working people, that he "went to the State House and saw several influential members, who succeeded in

[1] House, No. 292.
[2] House, No. 396.

killing the bill." It was refused a third reading in the House by a vote of eighty-six to forty-two.

In the present year, Governor Greenhalge, in his address to the legislature, makes the following request:[1]

"I ask you also to consider the expediency of requiring that practitioners of medicine be registered in somewhat the same manner as pharmacists are now registered. In every state of the Union, except five, such a system of registration has been established, and it cannot fail to protect the public, and at the same time help to maintain a high standard among medical practitioners."

Pharmacists are registered by a board of registration appointed by the Governor and Council. The candidate is examined, receives a certificate, if qualified, and the certificate must be conspicuously displayed in his place of business. Unregistered pharmacists transacting the business of pharmacy are punished by a fine not exceeding fifty dollars.

The above section of the Governor's address, also a bill to regulate the practice of medicine and surgery by the registration of practitioners,[2] were referred to the Committee on Public Health. They reported, three members dissenting, the bill[3] "to provide for the Registration of Physicians and Surgeons." This bill was essentially the same as the House bill (No. 445) of 1885, and corresponded very closely with the Act of the same year to establish a Board of Registration of Phar-

[1] Address, p. 39.
[2] House, No. 137.
[3] Senate, No. 155.

macy. As a substitute for this bill, Senator Kittredge offered another,[1] which is practically the bill recommended in 1889,[2] with a smaller penalty and a clause making it a misdemeanor to append, without authority, the letters M.D. to the name of the person. The committee's bill was advocated in the Senate by Dr. Harvey, and was passed to be engrossed; Mr. Kittredge's substitute being defeated by a vote of twenty-two to six. The bill[3] as passed by the Senate differs from the committee's bill, in containing, as amendments, a clause preventing more than three members of the board being at one time members of any one chartered state medical society; also that practitioners of three years' continuous practice before the passage of the bill should be entitled to registration; also, that all applicants with the degree of M.D. from a legally chartered medical college or university having the power to confer degrees in medicine in this commonwealth shall be registered in the future without examination.

Finally, the bill was so amended as not to apply "to clairvoyants, or to persons practising hypnotism, magnetic healing, mind cure, massage methods, Christian science, cosmopathic or any other method of healing," provided such persons do not advertise or hold themselves out by the letters M.D., or the title of doctor, meaning doctor of medicine.

[1] Senate, No. 178.
[2] House, No. 487.
[3] Senate, No. 263.

Senator Kittredge claimed that there were four thousand remonstrants against the bill, and none but doctors in its favor.[1]

Some of the opponents of the attempt to secure the legislative control of the practice of medicine in Massachusetts have placed themselves on record in the public press. The personal characteristics of many of those present at the hearings have been thus described:[2]

"What a collection of them there was in the Green-room at first, and afterwards in the large hall of the House of Representatives, to which an adjournment was necessary on account of the crowds! Medical blacklegs of all kinds, deceitful clairvoyants, long-haired spiritualists, necromancers, wizards, witches, seers, magnetic healers, pain charmers, big Indian and negro doctors, abortionists, harpies who excite the fears and prey on the "indiscretions" of the young of both sexes, who treat venereal diseases with the utmost secrecy and despatch, who have good facilities for providing comfortable board for females suffering from any irregularity or obstruction, who sell pills which they are very particular to caution women when pregnant against using; *et id genus omne*. Some of them looked sleek, well fed and prosperous; others seemed to have come from the very slums of destruction. Most of them had a coarse, animal, degraded look."

Eminent and able counsel have been repeatedly employed to represent the opposition. The means by which counsel may be procured, and attendance at the hearings ensured, is suggested in the circular of which a copy is herewith given. It is headed by the names of "Prof. J. Rodes Buchanan, M.D., Pres., San Francisco,

[1] *Boston Daily Advertiser*, April 18, 1894.

[2] N. E. Med. Gaz., 1880, XV., 65.

Cal., and J. Winfield Scott, Sec'y, Boston, Mass., Publishers and Gratuitous Distributors of Literature devoted to Public Health, Constitutional Liberty and Reform Practice."

The document contains in a seal or device the words, "National Constitutional Liberty League, Boston, Mass., Incorporated Oct. 30, 1888." It reads as follows:

BOSTON, MASS., ... '94.

"DEAR FRIEND OF FREEDOM AND JUSTICE: --

A critical emergency is upon us. Liberty and life are trembling in the balance. The urgency of the legislative situation impels to a third and final appeal. A hearing on one of the three threatened bills has actually been appointed and adjourned because we were unprepared -- had not sufficient funds to secure a competent attorney. The bill prohibits, absolutely, the practice of all save M.Ds. Only by the strictest economy, pinching here and skimping there, can we conduct triumphant state campaigns upon a paltry $5,000 or $6,000. A successfull political campaign, covering identical territory, and effecting similar results, costs five or six times as much. Think of it! The hearing set for the 21st, and less than one half the necessary amount guaranteed! Unless the recipients of this call, respond promptly and generously the would-be remonstrants must suffer the second hearing to go by default also, and the medical monopolists allowed to win an easy victory. The few who have heretofore subscribed thousands annually, feeling they have already contributed more than their share, are this year giving only hundreds. This deficiency can easily be made good by numerous small contributions of $60 and $120 payable in monthly instalments of $5 or $10. True, times are hard, but they will be harder still for progressive practitioners if either of the three bills pass, as they surely will unless a common fund and common fight prevents. Will you contribute a small percentage of your monthly income towards the defence of your own rights and those of your patients, or supinely

surrender your entire practice to your rivals? They are politically prepared and financially equipped for a struggle worthy of a better cause. If those who have NOT responded to our former appeal will now do so as promptly and generously as those who HAVE, we will realize a sufficient sum to conduct a successful campaign. Pardon us if we repeat: --

Precious time is swiftly passing. Prompt action is urgent--indispensible--imperative. Delay is dangerous. Don't eat or sleep until you have sent in your pledge and started the twin petitions. We URGE you with all the earnestness and emphasis possible, to promptly return one of the enclosed Free-Will Offering forms signed for the largest sum you can possibly pay monthly during 1894. Unless immediate responses encourage the undertaking you will not be called upon for any part of the pledge. Won't you contribute cash or pledge monthly payments for a full year AT ONCE? We urge--we beg you to come forthwith to the rescue with Pledges and PETITIONS. Let us not surrender without a struggle. As so very much depends upon YOUR response we earnestly hope you will do your very best and persuade others to do likewise. Remember that in ten years our National League has conducted over twenty campaigns in variōus States and never been beaten. And we will win this year too, if ample munitions are supplied.

Yours for liberty and justice

J. Windfield Scott, Sec'y."

On the back of this document is printed:

"RALLY TO THE RESCUE.

Attend the hearing Wednesday and cast your voice and influence for liberty and justice. Let everyone opposed to medical monoply prove it by their presence. Bring your friends with you. COME EARLY."

Accompanying this remarkable document were the two forms mentioned, one in black, the other in blue ink. A copy of the latter is here given:

$60.00

No. ..... 1894.

FREE WILL OFFERING.

In consideration of the praiseworthy past educational services and reformatory efforts of the NATIONAL CONSTITUTIONAL LIBERTY LEAGUE, and in encouragement of its proposed vigorous campaign against medical legislation in Massachusetts this year, we herewith remit $....., and hereby and cheerfully agree to pay each month during 1894 to J. WINFIELD SCOTT, Sec'y, at Room 30, 383 Washington St., Boston, Mass., the sum of Five Dollars.

Name .....

Complete address ....."

The statement of previous efforts is substantiated by the following extract from the closing argument of Charles E. Gross, Esq., before the Judiciary Committee of the Connecticut Legislature in 1893:[1]

"Before the first hearing, Mr. Chairman, a circular was sent broadcast through this State in certain lines of medical practice. * * * * * Let me continue the circular:

NATIONAL CONSTITUTIONAL LIBERTY LEAGUE,
INCORPORATED, OCT. 30, 1888.
BOSTON, MASS.
PUBLISHERS AND DISTRIBUTORS OF
MEDICAL LIBERTY LITERATURE,
BOSTON, MASS., '93.

Dear Friend of Freedom:

I am reliably informed that a monstrous medical law is likely to be enacted by your Legislature.

'Forewarned is forearmed.' We beseech you to bestir yourself instantly and incessantly in behalf of constitutional liberty, until this medical monoply measure is overwhelmingly defeated by a righteously indignant populace. If you would profit by our years of successful experience, and

[1] Proc. Conn. Med. Soc., 1893, 286.

desire our coöperation, begin the circulation of the accompanying remonstrance forthwith. When you have secured from one to five hundred influential signatures, with addresses and occupation, copy the addresses complete and send to us. Then mail the remonstrance to your Representative or Senator.

Equipped with our league literature, the majority of them could, and would (with secret exultation), defeat the proposed medical bill with neatness and dispatch. Therefore it is of the utmost importance that your Senator and Representatives be thus immediately supplied with the medical liberty literature described by the enclosed circular.

Kindly keep us constantly advised of what you are doing and the progress of the bill.

Yours for constitutional liberty,

J. Winfield Scott, Sec'y.

* * * * * * * *

An Invitation.

P.S. Since dictating this letter we have suggested, and influential citizens secured, the postponement of the hearing until Wednesday, March 8th, in the Superior Court room.

It is of the utmost importance that citizens who have been cured by other than "regular" M.D.s attend the hearing and testify regarding their treatment.

It is equally important that those who would maintain their constitutional liberty of choice of physician or healer personally appear to signify their determination to defend this inherent and inalienable right.

We earnestly hope that you will attend, and persuade as many others as possible to go, thus by your presence casting your personal, moral influence in behalf of freedom and justice. Write us at once at Hartford, Conn., if you can come, and tell us how large a delegation you can probably muster. As you value your medical liberty, we beseech you not to neglect the important duties outlined herein. Remember that health and happiness, and human life, depend upon the defeat of this medically monopolistic measure. Dare to do your duty.

J. W. S.

A Thunderbolt of Captivating Eloquence and Sublime Oratory.

(In Press)

Mr. Joseph L. Barbour's unanswerable argument, March 8, 1893, against medical legislation, before the Legislative Judiciary Committee of Connecticut, was a matchless masterpiece. It rightfully elicited round after round of irrepressible applause. The wide-spread distribution of this powerful, persuasive plea for the people will kill the bill and endear their champion to the hearts of every medical liberty-loving citizen.

Every legislator, and every citizen whose influence is desirable at the State House, should be supplied. Regular retail price, 25 cents.

Procure and distribute all you can, and persuade every one else to do likewise.

* * * * * * * * * *

Then follows another: * * * * * *

Doctor: One more word of warning!

If you were as familiar as I am, after years of court and legislative experience in nearly every State, with the cunningly devised tricks and traps of allopaths to ensnare and subjugate homœopaths and eclectics, I believe you would look before you leap into the ingenious and inquitous snare set by the Connecticut medical bill.

Are you ready for this?

If not, and you can't come to the hearing March 21st to protest, write us at once (at 152 Allyn Street, Hartford, Conn.) a letter denouncing the medical bill, and I will have it read before the committee.

Also write your members of the Legislature forthwith that you hope they will oppose the bill by voice and vote.

Sincerely yours for constitutional liberty,

J. Winfield Scott, Secretary.

Next came this:

An Open Letter.

Dear Devotee of Constitutional Liberty:

The quarrel of the M.D.'s before the Judiciary Committee at Hartford, Wednesday, March 8th, wastefully

consumed all the time, save that so admirably improved by the splendid speech of Joseph L. Barbour in behalf of medical liberty. The people themselves are to be heard by the same committee, Tuesday afternoon, March 21st.

We are told your presence and influence will aid the cause of medical liberty. Come.

In the meantime it is of the utmost importance that remonstrances be immediately circulated and extensively signed by influential citizens, and promptly placed in the hands of local representatives and Senators, together with our $1.00 package of medical liberty literature.

We earnestly hope that you will attend and persuade as many others as possible to go, thus by your presence casting your personal moral influence in behalf of freedom and justice. As you value your medical liberty, we beseech you not to neglect the important duties outlined herein. Remember that health and happiness and human life depend upon the defeat of this medically monopolistic measure. Dare to do your duty.

J. Winfield Scott, Secretary.

P.S. After the hearing a decidedly necessary and important conference to consider

What to do Next

has been called to meet at 152 Allyn Street at 7.30 sharp. Every so-called "irregular" practitioner should arrange to attend and help devise further plans for the defeat of the bill and for future protection should it pass.

J. W. S.

Now coming down a little later:

Publishers and Distributors of
Medical Liberty Literature.
Boston, Mass., 1893.

Dear Co-worker:

At the hearing at Hartford, March 21, the quacks who are clamoring for "protection" accused the so-called irregulars of malpractice, and the hearing was adjourned to afford them an opportunity to prove it.

It is evident this battle must be carried through the Senate and House. The doctors are, and have been, lobbying the Legislature for some time.

Tuesday evening's conference, to consider what to do next, adjourned to meet Monday evening, March 27, at 7.45 o'clock, with Mr. Patterson, Room 22, "the Goodwin."

Every progressive practitioner is vitally concerned, and should attend without fail.

Address until further notice,

J. Winfield Scott, Secretary,
152 Allyn Street, Hartford, Conn.

The last circular is as follows:

National Constitutional Liberty League,
Incorporated October 30, 1888.
Boston, Mass.
Prof. J. Rhodes Buchanan, M.D., President.
J. Winfield Scott, 383 Washington St.,
Boston, Mass., Secretary.

Boston, Mass., 1893.

Dear Devotee of Constitutional Liberty:

The next page explains the origin and utility of "Allopathic Czar Parties." They are potent and popular educational entertainments -- admirable first steps towards a Local Liberty League—leading to a Chatauqua-like course of studious reading. We appeal to you to send stamps for one or more copies of "Allopathic Czars" and invite a score of neighbors in to enjoy the fun. At the close, when everyone is in a rollicking good humor and full of enthusiasm, appoint another meeting and take a five or ten cent collection for our entire League Library: price only $1.00—less than cost.

Hoping to hear favorably and frequently from you, we remain yours for health, humanity and constitutional liberty.

Earnestly yours,

J. Winfield Scott, Secretary."

The following statement[1] concerning the source of opposition to medical legislation in Georgia may be interesting. It seems that in November, 1892, the preliminary steps were taken leading to the preparation of a bill which was submitted to the legislature then in session. It passed the Senate by a vote of thirty-five to nine. The opposition was aided by a lawyer hired to oppose this bill by a noted itinerant practitioner of Boston. It is, furthermore, an open secret that the services at the State House of an eminent lawyer conspicuously opposed to one of the proposed bills were paid for by a person whose name is to be found in the Boston Directory among the physicians of Boston, not designated as belonging to any of the incorporated medical societies.

With your permission, attention will now be directed to what may be regarded as the essentials of a law regulating the practice of medicine, and to what extent they are present in the Massachusetts law now before the legislature. It should not be forgotten that it is largely owing to the efforts of a Fellow of the Massachusetts Medical Society, Dr. Edwin B. Harvey of Westboro', that the progress of this bill has been promoted.

That the State may properly control the practice of medicine in the interest of the public, it is desirable that the laws should be so constructed that their provisions may be carried out in the simplest and most direct way possible. The title of the act is not an important feature if the purpose is

[1] Atlanta M. & S. J., 1893, X., 129.

clear, and whether physicians are licensed, registered or regulated, is less essential than that they should be duly qualified by intelligence, education and morals. The necessary degree of intelligence and education must vary with the intellectual development of the people at the time; and it is useless to make the standard so high as to be beyond the reach of a considerable minority, or so low that the majority consider it worthless. Neither should the law become a dead letter, and no legislation at all is better than laws forgotten or not enforced.

The State must assign the duty of regulating medical practice to trustworthy citizens, properly qualified. These are necessarily physicians, although they in turn may be supervised by a smaller board, as that of the Regents in New York, the Medical Council of Pennsylvania, or the State Board of Health in Connecticut. It is unwise, and, in most States impracticable, to place this authority in the hands of any single medical society, owing to the fact that all incorporated State societies are equal in the eyes of the law, and each is of so much influence as to antagonize the limitation of control to the other.

In Alabama and in North Carolina alone has it been found possible to entrust this power to a single State society. In the former, in 1890, Dr. Cochran of the Board of Censors says:[1] "We have a very few homœopathic practitioners in Alabama; but a considerable number of doctors,

[1] Page 312.

who, graduated in eclectic schools, have availed themselves of the advantages we have to offer them, and have become good working members of our organization." In North Carolina, the law making it the duty of the State medical society to examine and license all practitioners of medicine and surgery was passed in 1858–9, at a time when but little opposition from other sources was likely to have existed. In 1880, as a result of the law, there was a very small number of irregular practitioners in the State.

The experience of the vast majority of the States of the Union is in favor of the appointment of the controlling board by the Governor of the State. It has been urged that this will tend to make the position political and partisan. This effect may be modified in some measure by providing that at least one member shall be annually changed. In some States it is provided that appointments shall be made from nominees of incorporated State societies. Medical societies, however, are not free from the possibilities of partisanship. Certainly, medical appointments in the State of Massachusetts by its Governor and Council have rarely been open to the charges of personal or political favoritism prevailing over conspicuous merit.

A more important question relates to the transfer of the control to the State Board of Health or to an especial board. The former exercises this authority in comparatively few of the States, although with conspicuous success in Illinois. State Boards

of Health, however, are not exclusively medical boards. Questions which come before them are of so various a character that lawyers, engineers, merchants, and mechanics, as well as physicians, are needed in their deliberations. The regulation of medical practice relates solely to qualifications, of which physicians are the best competent to judge; and the question of determining these qualifications would, in the end, necessarily be assigned to the medical members of the board. These members should be especially adapted to the purpose, and might be unfitted for the general duties of Boards of Health.

They should be selected as intelligent, educated, fair-minded, honest and upright representatives of the entire profession. They should be practitioners and not teachers, that there should be no possibility of the suggestion of favoritism in the treatment of an especial set of applicants. The members of the board should have been in practice for a number of years, that their inquiries into the qualification of the applicant might be based less on theoretical than on practical knowledge. They should be representatives of different sections of the State, that the interests of the public in the remote villages might be equally protected with those in the most populous cities. The experience of the various States is largely in favor of the establishment of a Board of Examiners independent of the Board of Health.

The question which next presents itself relates to the composition of the board with reference to

the representation of the incorporated State medical societies. Shall these be represented in a single conjoint board, or shall there be as many independent boards as there are incorporated societies? From the ease with which corporations are formed in the various States under a general law, the question practically resolves itself into the representation of the three societies with the largest membership.

If a single board is established it should have an equal or a proportionate representation of the regular physicians, the homœopathic and eclectic physicians. The establishment of a single board is objected to by some of the regular physicians, especially the older members of the profession, on the ground that it compels them to approve the licenses of homœopathists and eclectics, whom they have already opposed in every possible way as undeserving the confidence of the community. It, furthermore, makes the homœopathists and eclectics judges of the qualifications of students of the regular schools, and permit the former to combine in opposition to their license, which would destroy the advantages to be derived from the regulation of medical practice.

The homœopathists object to a conjoint board, if formed on proportionate representation, since such an apportionment would give a majority representation of regular physicians, and partisan zeal, favoritism and illiberality would result, with a tendency to diminish the number of homœopathic students. This view is advocated by Dr. H. M.

Davenport,[1] who gives as an illustration the experience in Canada, where, of 1,230 licenses given in eighteen years, only 19 were given to homœopathists. He also adds that in Minnesota, in 1888, where a single board exists with a homœopathic minority, only one-fifth of the homœopathic applicants for registration "were allowed to pass." On the contrary, one of the homœopathic members of the Examining Board of that State "spoke very highly of the Minnesota law and its workings, and said he was entirely satisfied with the way the remainder of the Board conducted the examination, and with the fair way in which he was treated and allowed to conduct his examination. He considered a common Board of Medical Examiners as the best."[2] The feeling here expressed can hardly be considered to prevail among homœopathic physicians, and the argument of H. M. Paine before the Judiciary Committee of the New Hampshire[3] legislature perhaps more nearly represents their views. The latter are expressed[4] editorially as follows:

"On general principles it is a good thing to make a strong stand against medical examining boards, provided we have the strength to resist the demand for the establishment of such boards; if we have not, then it will be good politics to acquiesce to the demands, and to insist that there shall be created separate and distinct examining boards for the homœopathic profession. Under no consideration should we ever be led to accept the single board plan.

[1] N. Am. J. of Hom., 1889, IV., 706.
[2] N. Western Lancet, 1891, XI., 7.
[3] Hahnemanian Monthly, 1891, XXVI., 281.
[4] *Ibid.* 409.

* * * The greatest danger of the single board rests in the fact that a large number of students will prefer to graduate from institutions in sympathy with the majority of the examiners."

The objection to a triple board is to be found in the probability of separate standards of proficiency, which would diminish the value of the license. Candidates rejected by one board might seek for a license from a set of examiners less exacting in their demands, unless prevented by law. The license thus obtained would be as valid as if secured by more exacting methods. If it is replied that a supervising board might be established, as in New York and in Pennsylvania, it may be said that it makes the machinery of licensing too cumbersome in requiring four boards where one would answer.

A single examining board has the advantages of simplicity, uniformity of standard, and freedom from partiality. Although appointments to it might be made which would result in friction, quarrels and dissension, the benefits to arise as regards the public are such that this method of carrying out the designs of the law should first be tried. None need serve upon it who are unwilling to act from the best of motives. And as harmony prevails in many medical boards thus constituted, in various sections of the country, equal success may be anticipated from future attempts. One safeguard should be insisted upon, either exclude the subjects of materia medica and therapeutics from examination, or make the repre-

sentatives of the several schools the sole judges of the qualifications in these subjects, the applicant having the choice of the various sets of questions prepared.

It should be the duty of the Board of Examiners to consider and decide upon the qualifications of the candidates, and to grant a license to practise to the successful candidates.

What shall be these qualifications? The custom in the various States, as we have already seen, differs widely. In some, the possession of a satisfactory diploma of graduation from a medical school or institution incorporated with the privilege of granting diplomas, suffices. In others an examination is necessary. In some, a satisfactory diploma is necessary that the candidate may be examined; in others, the examination is the sole test of the qualifications. If the diploma is to be regarded as satisfactory, it must be inspected and verified. The definition of what is a satisfactory diploma must rest with the board, and what is satisfactory in one State may prove to be the reverse in another.

In the earlier days of legislative action, the diploma of a regularly chartered medical school, or the certificate of a chartered licensing body as a State, county or district medical society, was regarded as satisfactory evidence of a sufficient degree of education. This led to the infamous traffic in American diplomas throughout this country and in various parts of the world, which became a national disgrace, and from which the

country even now has not wholly recovered. Rival medical schools of low grade were legally incorporated, especially in the Western States, with all the rights and privileges of the best schools. Such favorable terms were offered to students that it became possible to be graduated in the course of a few months without any especial preparation. Courses of lectures were made short and examinations easy, students even being informed in advance of the questions to be asked. This corrupt sale of diplomas reached such a degree in Pennsylvania that, in 1872, a committee of the legislature investigated the subject and found that for a long time diplomas had been sold, in many instances to persons without any medical or scientific attainments whatever. An instance is given where a diploma was made out for an infant two years old at a charge of $200.00. An itinerant exhibited on street corners, and wherever he went, three diplomas from as many medical colleges in the United States.[1] John Buchanan of Philadelphia was the ringleader in this business. He obtained control of the charters of extinct schools, got new charters, and advertised extensively the sale of his diplomas. The courts were obliged to sustain their legality, but finally he was exposed through a reporter of the *Philadelphia Record*, to whom he sold, under various fictitious names, eight diplomas, several conferring the degree of M.D., one that of D.D., another that of D.C.L., and still another that of LL.D.[2]

[1] Sibbert, Trans. Med. Soc. Penn., 1880, xiii, 1, 53.

[2] N. Y. M. R., 1890, xxxvii., 377.

The Illinois Board of Health was most instrumental in putting an end to this traffic in fraudulent diplomas. In 1880 it refused to accept as evidence of qualification the diplomas of twelve legally chartered medical colleges. In 1884[1] it showed the nature of the traffic in diplomas in Massachusetts. This State enacted a general law in 1874[2] providing that corporations might be formed by voluntary association for "any educational, charitable, and religious purposes, for the prosecution of any antiquarian, literary, scientific, medical, artistic, monumental, or musical purposes, etc." Several medical schools were formed under this statute, the most famous of which was the Boston Bellevue Medical College, incorporated May 25, 1880. It was charged with illegally issuing or selling its diplomas. Its officers were arrested on the accusation of using the United States mails for illegal purposes. They pleaded in defence that they were empowered by the laws of Massachusetts to issue diplomas and confer degrees without any restriction as to the course of study or professional attainments. The United States Commissioner held the plea to be valid and dismissed the defendants. Within a fortnight "the American University of Boston" was incorporated. A few weeks later "the First Medical College of the American Health Society" was added to the medical schools of Boston. When the attention of the legislature was called to this abuse of the law it prohibited corporations or-

[1] Report Ill. State Board of Health, 1884, VI., 9.

[2] Statutes, 1874, ch. 375, § 2.

ganized for medical purposes under this statute from conferring degrees or issuing diplomas or certificates conferring degrees unless specially authorized by the legislature so to do.[1] But the names of the Boston Bellevue Medical College, the American University of Boston, and the First Medical College of the American Health Society, are still to be found among the legally incorporated institutions of Massachusetts.

The importance of the inspection of diplomas is thus apparent that fraudulent diplomas may be excluded. Some of the low-grade schools have improved their facilities for giving instruction and their requirements for graduation to such an extent, that the diploma after a certain date is satisfactory evidence of qualification, whereas those given in years before such a date are unsatisfactory. Not only should the diploma be acceptable but it must also be verified. Diplomas have been lost, sold and stolen, and have been cancelled or counterfeited. It has, therefore, been found necessary for verification, that the candidate presenting a diploma as to his qualification for a license should make an affidavit, before a person authorized to administer oaths, that the diploma is genuine, not given for money alone, nor cancelled, that the applicant is the person therein named and the lawful possessor, that it was procured in the regular course of medical instruction, without fraud or misrepresentation, from a medical school or institution legally incorporated at the time of its be-

[1] Statutes, 1883, ch. 208.

stowal to grant medical degrees, having a full body of medical teachers, actually and in good faith engaged in the business of medical education, and during a definite period of time.

The law would be simpler, fairer and easier of execution, if, as in twelve States, an examination were made the sole test of the applicant's intellectual and educational qualifications. Such a uniform test relieves the law from the charge of class-legislation, and permits the standard to be raised or lowered in accordance with the educational development or the social needs of the State concerned. The examination should be elementary and practical, both oral and written, with demonstrations when feasible, and should be designed to elicit rather the minimum than the maximum of requirement. Only licensed physicians should serve the State, and a higher order of fitness should be demanded from them than from those who serve the individual only. The latter may be satisfied with an assurance of therapeutic knowledge, the former may believe that this exists provided the other qualifications are present. The State should therefore require a certain knowledge of anatomy, physiology, chemistry, pathology, surgery, obstetrics and the diagnosis and treatment of disease before granting the license. The highest attainment of medical knowledge will always be demanded by the universities which are the chariest of the reputation of their degrees. A lower standard suffices for the State medical society desirous of including within its ranks all

the intelligent, educated and moral physicians of the State. The last must recognize the existence of two classes of practitioners, the licensed and the unlicensed. The former alone should be authorized to perform all public services, the latter may be permitted to treat the sick on condition that it shows, in advance, a knowledge of contagious diseases and the means of preventing their spread.

The examinations should be of a semi-public character, best accomplished by the preservation for a limited time of the questions and their answers. Such documents will give the best evidence of the fairness or unfairness of the examiners, and will show the scope. It would be well for some of them to be published from time to time, that the public may be informed of the effect of the law. This is done in Virginia and Minnesota, and a few of the questions and answers are here given. The following are from Virginia:[1]

"Give general and descriptive anatomy of the stomach- It is the organ where the food is digested; it is a very ex. tensive organ."

"Describe or define a cell. It is a place of confinement."

"The normal temperature of the human body is from 112° to 140°, and the average respirations are 70 per minute."

"The technical name of rhubarb is columbo."

"The dose of antipyrin for a child five years old is fifteen grains every three hours, and that of morphia hypodermically for a child of the same age would be one-fourth of a grain, "and if that doesn't give relief I would give one-half grain."

"Phymosis is the result of old age. To the question of the diagnosis of the dislocation of the head of the femur on

[1] Coll. and Clin. Rec., 1890, XI., 8. J. Am. Med. Assoc. 1891, XVI., 108.

the dorsum of the ilium, it is replied, "Don't know much about the diagnosis, but the treatment is amputation."

"The symptoms of œdema of the glottis are that the patient feels husky and has a sore throat. I would amputate it if necessary. I would do the operation within three or four months if it was a bad case."

"Extra-uterine pregnancy may be a fungoid growth or tumor, fibroid in its character, or any extra growth in the utrous would be call extra-uterine pregnancy."

"A breech presentation may be known by the sense of touch, the buttox being different in formation from the cranium. The anus is different from the mouth, absence of tongue and nose. Get your finger in the inguinal region soon as possible and assist your patient by ferm but gental tention."

"The best way to facilitate the expulsion of the placenta is to let the woman get up and walk about the room, allowing five minutes to elapse after delivery before requiring her to get up and walk."

In Minnesota the following answers were given:[1]

"The scrofulous diathesis is known by a peculiar greasy exudation from the axilla or inside of the thighs, possibly behind the ears; has a sour, fetid, strong smelling odor."

"Symptoms of cardiac dilatation—a dull pain at pit of stomach, and a feeling of water in the bowels, ematiation, anema, loss of flesh. Treatment, put patient on a milk diet, and give rectal onema of pepsonical food, and a nerve tonic to tone up the system."

"Treatment of neuralgia—if the part is swollen up such as the cheak may apply a worm poultice, paint the part over with iodine."

"Locomotor ataxia—hear all the lesions or pathology changes is situated in the forth ventricle of the brain, and a slight pathological chage in the peduncles of the seberlium (I am rattled if that ain't right.)"

* * * * * * * *

"Placenta prævia this is a retaining of the placentá structures after the delivery of child, and a part of the placenta), all is to be done in this case is to introduce the

[1] N. West. Lancet, 1891, XI., 139.

hand or a instrument and remove any of the membranes that is left or curet the utris."

"Symptoms of typhoid fever—the patient has a tongue heavily fured putrid offensive; head feels scattered about."

The candidate who has passed a successful examination receives a certificate to this effect—the license—which is recorded in the office of the board of examiners and should be registered elsewhere, that the names of the legally qualified physicians may be readily found. The place of registration varies in the different States. In many the County Clerk is the registering officer, in others the Clerk of the Superior Court, or of the District Court has charge of the register. In South Dakota it is kept in the Registry of Deeds, while in Alabama the Judge of Probate is the officer of registration. The importance of such registration is illustrated by the experience of North Carolina in 1891, in which year many physicians remained unregistered, of such influence and standing in the community as to defy the law with impunity.

The examining board should have the power of refusing or revoking licenses for cause, and should be able to subpœna witnesses, hear testimony and decide. Any appeal from the decision should be made to the Governor. The cause for such revoke or refusal of the license should be criminal, unprofessional, dishonorable or disgraceful conduct. Instances of unprofessional conduct are to be found in untruthful or improbable advertisements of promised treatment, deceiving the public; advertising methods or medicines regulating menstruation or re-establishing suppressed menses.

That the law may be enforced it is necessary that there should be a penalty for evading its provisions, and officers to bring charges against the law-breakers. The penalty varies in the United States from $10.00 to $500.00 fine, or imprisonment from ten days to a year, or it may be both fine and imprisonment. A severer penalty should be enforced for repeated offences. The severest penalties are inflicted for filing or attempting to file the certificate of another or for false or forged evidence; the crime is then regarded as felony, punishable as forgery.

It has been found difficult to enforce the laws in many States, since some examining boards object to being both accusers and judges. Physicians are usually unwilling, and prosecuting officers refuse to bring charges, unless it is made their duty. In certain States any person may sue and recover for evasion of the law. In Wyoming it is the duty of the police, sheriff or constable. It should be made the duty of the examining board to bring charges before the proper officials. This responsibility will be so grave as not to be lightly undertaken, and should only be assumed in such instances as the public will approve.

All recent legislation has been found impossible without first harmonizing the most powerful antagonists. The State makes no distinction between the various incorporated medical societies, and will not legislate at the suggestion of the one if the others oppose. Regulars, homœopathists and eclectics, and all practitioners possessing a diploma

or license to practise, must therefore be united in their approval of the provisions of the bill. The law must not exclude from practice those who have been employed for a period of years, and who during this time have had equal rights with members of the incorporated societies. Its prohibitory provisions should not be enforced until a sufficient lapse of time to allow registration to be accomplished, and examinations to be held throughout the State. Permission to register should thus be allowed to all practitioners with or without diplomas or certificates at the time of the enactment of the bill, or to those only who have been in continuous practice for one or more years. The limit most frequently assigned is ten or more years. After the enactment of the bill all practitioners of medicine should register within a limit of time, from six months to a year, or be subject to the penalty.

The law should define what is meant by the practice of medicine, this having been found necessary both in avoiding ignorant opposition to its acceptance, and in securing the enforcement of its provisions. The following definition appears in the law of Georgia:

"To practise medicine means to suggest, recommend, prescribe, or direct, for the use of any person, any drug, medicine, appliance, apparatus, or other agency, whether material or not material, for the cure, relief, or palliation of any ailment or disease of mind or body, or for the cure or relief of any wound, fracture or other bodily injury, or any deformity, after having received or with the intent of receiving therefor, either directly or indirectly, any bonus, gift, or compensation."

In Minnesota "appending 'M.D.,' or 'M.B.,' to name, or prescribing, directing or recommending for use [of any person] any drug or medicine or other agency for the treatment, care or relief of any wound, fracture, or bodily injury, infirmity, or disease, is regarded as practising medicine."

The following persons should be exempt from the action of the law: medical officers of the army and navy of the United States, or of its Marine Hospital service; legally qualified physicians or surgeons called from other States to attend patients in the State concerned, or to consult with the physicians caring for them; members of the resident staff of any legally incorporated hospital or asylum; medical students under the direct supervision of their medical teachers; midwives attending cases of confinement; nurses in their legal occupation; dentists, exclusively practising dentistry; manufacturers or dealers in artificial eyes, limbs, orthopedic instruments, or trusses or like apparatus for the use of the sick or infirm; pharmacists or apothecaries dispensing or selling medicines or medical appliances; sellers of mineral waters, or of patent or proprietary medicines in the regular course of trade; gratuituous advisers in cases of emergency; domestic prescribers; persons giving advice in regions where there is no licensed physician within ten miles.

The Connecticut law of 1893 also exempts chiropodists or clairvoyants not using in practice drugs, medicines or poisons, persons practising massage or Swedish movements, sun-cure, mind-

cure, magnetic healing, or Christian science, and persons not using or prescribing in their treatment of mankind, drugs, poisons, medicine, chemicals or nostrums.

To what extent does the proposed Massachusetts law comply with these essentials?

The board of registration is composed of seven members, of whom not more than three shall be at any one time members of any one chartered State Medical Society, and it is appointed by the Governor and Council. This action is fair to all and the appointment lies in the hands of the executive of the people.

All practitioners of medicine graduated from legally chartered medical colleges or universities having power to confer degrees in medicine, and every practitioner of medicine in this State continuously for three years previous to the passage of the act, shall be entitled to registration upon the payment of a fee of one dollar, and must be registered by Jan. 1, 1895. This section is fair to the majority of the irregular practitioners, whose legal status up to the enactment of the bill is equal to that of the medical graduates of incorporated schools and universities. It gives them no privileges not already possessed. Any person not entitled to registration as aforesaid may pass an elementary and practical examination wholly or in part in writing, embracing the subjects of surgery, physiology, pathology, obstetrics and the practice of medicine and sufficiently strict to test his or her qualifications as a practitioner of medicine.

Such an examination would permit any competent and trustworthy practitioner, who had been in practice for less than three years, to be registered even if possessed of no degree. A person who can show that he knows how to practise surgery, obstetrics and medicine should not be debarred by lacking a degree. He may not be the wisest, most skilful and moral physician, but he is likely to do no harm to the people at large.

Although certificates may be revoked for criminal cause, the original bill permitted them to be revoked for any cause satisfactory to every member of the board. The bill has been distinctly weakened by this amendment, since the public may be injured by unprofessional, disgraceful and dishonorable conduct on the part of the practitioner, as well as by that of a criminal nature.

The provision to make it the duty of the board to investigate all complaints of disregard, non-compliance or violation of the provisions of this act, and to bring all such cases to the notice of the proper prosecuting officers, is eminently judicious. It would have been more efficient had the board been allowed to subpœna witnesses.

The committee's bill required that after 1894 all applicants for registration should be examined. This section has been weakened by exempting the graduates of legally chartered medical colleges and universities of the Commonwealth. The standard may be much higher for their degree, but the State makes them privileged by practically granting them the power of license. There should

be no confounding of the license and the degree, and the chartered medical colleges or universities should be the first to request the elimination of this clause.

Sect. 10 is defective in that it allows the registered physician or surgeon to append to the name the letters "M.D." whether the degree has been received or not, and punishes the unregistered M.D., who has earned the title, by a fine if he does not register. The physician or surgeon is defined as one who advertises or holds himself out as such by appending the letters M.D., or using the title of doctor, meaning thereby doctor of medicine. But the law gives no definition of the practitioner of medicine for whose registration it is intended to provide.

The chief weakness of the law is the amendment to the committee's bill, which permits any one to practise medicine without an examination, provided such person does not make use of the title doctor or the letters M.D., meaning thereby doctor of medicine.

These are the practitioners who should be controlled—not because they harm the individual, for if he desires them that is his privilege, but because the ignorance of such persons is a constant source of danger to the entire community. If they are to be allowed to practise, and they are welcomed by some, the protection of all demands that they should show, by examination, a familiarity with the means of recognizing the contagious diseases, and of so treating them that they may not

promote the spread of small-pox and diphtheria, of measles, scarlet fever and the like.

The law is a safe-guard to the community to a certain extent. It represents essentially a return to the conditions which prevailed when the State assigned the duty of licensing physicians to the Massachusetts Medical Society. It enables a discrimination to be made between registered and unregistered practitioners, those of some education and those of no education; a distinction which will increase in value to the public in the course of time. If it has no other merit it provides for the appointment of State officials to execute the law, and thus offers a constant, impartial and efficient means of recommending to the legislature any necessary amendments in the future. It is of no value to the Massachusetts Medical Society, which has no need of it. Her standard will always be the loftier, however high that of the State may be raised. To be a member of the Massachusetts Medical Society will continue to represent association on terms of equality with the most intelligent, the best educated and the most honorable physicians of the State.

ARTICLE IX.

THE SHATTUCK LECTURE.

THE RANGE AND SIGNIFICANCE OF VARIATION IN THE HUMAN SKELETON.

By THOMAS DWIGHT, M.D.
OF NAHANT.

DELIVERED JUNE 12, 1894.

THE RANGE AND SIGNIFICANCE OF VARIATION IN THE HUMAN SKELETON.

In 1878 an essay on the Identification of the Human Skeleton had the good fortune to receive the Shattuck Prize offered by the Massachusetts Medical Society. It is fitting that the same line of thought should be developed in the Shattuck Lecture.

In that essay were discussed the recognition of the sex and age of the skeleton, the method of estimating the height and of making proper allowance for such parts as might be wanting. To some of these questions I brought methods of my own, but for many points I was forced to rely on the statements in books, too often quoted one from another. No part of medical literature is so perfunctory, artificial, and altogether unsatisfactory as medico-legal anatomy.

During my professorship at the Harvard Medical School I have tried to use the material for original investigations, to find new criteria of sex and of age, to observe the degree of asymmetry between the two sides of the body, to learn how frequently anomalies occur which would vitiate the usual methods of procedure, and finally to study the question of the relation between the external shape of the body, its peculiar individuality, and the shape of the supporting framework. Though, as I hope to show, these researches have not been fruitless, yet some of these fields have yielded little. Attempts have exceeded performances. But if the man is to be pitied who can travel from Dan to Beersheba and cry "'Tis all barren!" much more is the anatomist worthy of compassion whose studies in the dissecting-room show

him nothing but dry details of the structure of the body. It is his own fault if he brings no fresh learning to the great topics of the day. In these studies I have seen many luminous facts throwing light on the relations of the bodies of man and lower animals, on the peculiarities of prehistoric man, and on the process of development and growth. I shall not leave these quite without notice; but, speaking as I am to a medical audience, rendering as it were an account of my stewardship (for what is a professor in a Medical School but the trusted servant of the profession?), I shall bring into strongest relief those parts of the inquiry which are of most practical value in medico-legal questions. It would require a course of lectures, rather than a single one, to follow the steps of my investigations. I wish as much as may be to spare my audience the details, giving only the results. I shall not, however, confine myself exclusively to my own work, as it is my purpose to show the present state of our knowledge.

In living nature each species suggests a more or less ideal type, the exact counterpart of which the student often searches for in vain. This type is not the expression of the mean development; it is far above that. It is the perfect individual. It is what in a show of animals or plants would be called a "prize-winner." It is in such a specimen that we would study the relative development of the different parts. We shall never reach this by compiling the means of vast numbers of specimens. This latter method, however, if exercised with due care and discretion, will give us, not the type of the animal or plant as shown at its best, but the one most commonly met with. These two conceptions must not be confounded, for they are two different things, each of which has its place and its uses. When we come to Man, one ideal type is not enough. We should have to take each race by itself, were it not that I am dealing with the Caucasian alone. The differ-

ence caused by sex, however, requires one type for man and another for woman. Indeed, it may be said in parenthesis that this shows admirably the difference between the ideal and the average. What sort of a human figure would be reached by an average of measurements of males and females? This principle hereafter with advancing science must be carried even further, so as to recognize sub-types such as the tall, the short and the intermediate.

But nature shows the student more than the type and the mean. It even disguises them by numberless variations in many, often in opposite, directions.

The Sex.

Turning at length to the human skeleton, we find as in the whole body, two types, a male and a female. The typical skeleton reveals its sex so distinctly that none but a tyro would need measure and compass to find it. But to the anatomist there are many signs which to others are unknown, by which almost every bone in the body reveals its sex. This is not to say that it is always easy or even possible to decide on the sex of a skeleton. Far from it. We are confronted here with the effect of variation. The mean male or female skeleton is of course less easily recognized than the typical one. Then come those which have fewer and fewer characteristic points, till we find a certain number of which the diagnosis is very difficult or even impossible. My studies have been specially directed to these cases, among which we may reckon skeletons of which the most characteristic parts are wanting.

The sex has always been determined by the pelvis. I can reiterate my remark of sixteen years ago, that it is for that purpose of more value than all the rest of the skeleton. There is little or nothing to add.

The female pelvis is broad and the male deep. These remarks apply, however, chiefly to the true pelvis. There

is some discrepancy in the statements, as to the transverse measurements of the false pelvis. While I believe it is true that as a rule the anterior superior spines of the ilia are farther apart in woman, I question very much whether this is true of the most distant points of the iliac crest. Should the pelvis be wanting or too little typical to be conclusive, for such there are, we must turn to the general sexual characteristics of bone, which indeed will help us with the pelvis itself.

There is the male and female type of bone, there are the proportions of the body (which, however, are not of much use if the bones are separate), and there are the peculiarities of each bone. Of course the spheres of these different criteria fuse, one with another.

First, as to the general male and female characteristics. We all know that male bones are larger, stronger and more curved. Their ridges and projections are greater and rougher. It seems to be tacitly assumed that, excepting the mere size, these features depend on the greater muscular development of man. This I do not believe is the fact, at all events among civilized races. My observations go to show that female bones rarely assume the male development. I never find, even in the strongest, the same rough surfaces and ridges, rarely the same thickness. There is one sign which has received little attention and which repays research. It is the small size of the female articular surfaces. I shall return to this again and again, for it is of the greatest significance, and, as all the bones have joints, of the widest application.

Next, as to the proportions of the figure. The small thorax, both short and narrow, is essentially female. While it is true that the lumbar region of the spine is relatively longer in woman, the chief factors in the shortness of the thorax are the short sternum and small lower ribs. Add to this the relatively slight development of the upper ex-

tremities, and we are ready for the study of the individual bones.

The sex of the skull is very often fairly easy to determine. The relatively small size of the face, the lightness of the jaws, the small size of the superciliary eminences, of the occipital protuberance and ridges, and of the mastoid processes of the female are very suggestive. One feature, which I think of much value, is the more sudden change of direction from the forehead to the top of the skull in woman. Another, which we owe to Professor Cleland, is the more marked elevation above the occipital condyles in man, which throws the face higher up, departing more from the infantile condition which lingers in woman, as is shown by the more prominent frontal and parietal eminences. As a specimen of the male skull I show one which its late occupant would have been glad to have so used,—that of Spurzheim, the phrenologist.

The studies which I have undertaken on bones of the trunk and limbs must be given at some length. In my previous essay I had discussed on the basis of a very small number of observations of the STERNUM, the value of Hyrtl's law that "the manubrium of the female sternum exceeds half the length of the body, while the body of the male sternum is, at least, twice as long as the manubrium." I found then, curiously enough, that the averages of my measurements confirmed that law, but that the exceptions were equal to the cases in accord with it. More curiously still, I found this result repeated in a series of measurements large enough to be satisfactory (those of 228 bones), with the difference that the exceptions amounted to almost precisely 40%. Thus, though the law still held true in averages, it would fail to apply to two bodies out of five, and thus would be useless for the determination of any particular case. Farther, as yet unpublished, observations have raised my numbers to 342 sterna, of which 222 were male

and 120 female. My results once more confirm Hyrtl's law for the mean, but still approximately forty per cent. of the cases are exceptions, owing to the variability of this bone.

Strauch found in addition that in male and female sterna of equal length, the former is narrower in the manubrium and in the lower part of the body. According to him the female sternum is relatively (but not absolutely) broader than the male one. Hence we conclude that though averages may deceive us, yet it is possible to recognize very distinctly a male and a female type of breast-bone. The former with a relatively long and regular body, the lower parts of which are well developed, separating the attachments of the lower cartilages, the latter with a shorter body, broadened below and having depressions of the lower cartilages close together, indicating a want of development of the lower sternebræ. Intermediate forms of difficult diagnosis must occur. In these I should look for relatively large or small clavicular facets as signs of male or female sterna respectively. Here are more or less peculiar specimens. In this, which happens to come from a negress, the body ends opposite the fourth or fifth cartilage.

The separate bones of the spine and ribs offer little that is of practical value.

The whole upper extremity is much lighter in woman. The lighter shoulders rest on a smaller and relatively narrower thorax. The collar-bones are very characteristic. Strong, long, and boldly curved in man, they are slight, short and straighter in woman. The degree of curve is less characteristic than some other features, as we sometimes find slight but strongly curved clavicles in woman and strong straight ones in man. This depends on the peculiarities of the figure. The largeness or smallness of the articular surfaces is of much importance.

The Shoulder Blade is an extremely variable bone.

To me it is very interesting. I imagine that I shall surprise my hearers in speaking of its sexual characteristics as very remarkable. The scapular index, that is the ratio of the breadth to the length, need not be discussed, though I have measured 198 bones for this paper. Its sexual significance is practically nil. In a previous paper I have given drawings of two widely different scapulæ with almost identical indices.

While it is very difficult to state what, beyond small size and delicacy of build, constitute the sexual characteristics of the female scapula, yet there is no question that in well marked cases it has a characteristic type. In my opinion a competent expert can decide with great probability the sex of the scapula in at least four out of five of a considerable number of bones taken at random.

The mere question of size is an important one. I have examined the bones of 123 bodies, 84 male and 39 female, in which the height and breadth of shoulders were known, and have taken the length, breadth and index. By far the most useful of these measurements is that of the length, as shown in the following table:

LENGTH OF SCAPULA.

	Male.	*Female.*
LENGTH OF BONE.	NUMBER.	NUMBER.
From 13 to 14 cm.		10
" 14 " 15 "	3	13
" 15 " 16 "	10	11
" 16 " 17 "	32	5
" 17 " 18 "	30	
" 18 " 19 "	8	
" 19 " 20 "	1	

Average length of male bone, 16.8 cm.
" " " female bone, 14.7 cm.

As the two sides usually differ, I have in this series always taken the longer bone.

Thus it appears that of 123 bones 26 measure less than 15 cm., of which only 3 were male; also that 76 measure 16 cm. or more, of which only 5 were female. There is no single instance of a bone measuring less than 14 cm. being male, nor of one measuring 17 being female. It is needless to say that exceptions would be found in a very large series, but these limits are very valuable.

I have studied the dimensions and proportions of the glenoid cavity on 90 bones, of which 63 were male and 27 female. In brief, the female socket is not only smaller but relatively narrower. The average male length is 3.92 cm., and the female 3.36. Very few male sockets are less than 3.6 cm., and very few female ones as long.

When it comes to examining the various parts of the bone, one by one, it is very difficult to find sexual characteristics that will stand rigid examination; none the less I have little difficulty in defining a typical female scapula. It is more easy to do so than to define a male one, as the latter is more variable. The greatest length should not exceed 15. cm., and that of the glenoid should be about 3.4. The latter should look narrow and delicate. The inferior angle is sharp, the posterior border straight as far as the spine, its upper portion inclining forward. The upper border shows a sharp descent from the superior angle to the supra-scapular notch. The process for the teres major at the lower end of the axillary border is small. The coracoid is remarkably delicate, its end is compressed instead of knobbed. The acromion is narrow, of the shape called falcate by Prof. Macalister. In the male the lower angle is broader, the teres major process more developed. The posterior border is rather more rounded, the upper border more horizontal and higher, so as to make a larger supra-spinous fossa, the coracoid is thick with an approach to a knob at the end. The acromion larger, squarer, with a large clavicular facet.

In view of the considerable difference in size already mentioned, it is plain that the sex of most shoulder-blades may be determined by that alone beyond reasonable doubt. Many bones, however, are of the doubtful size. These, in my opinion, can for the most part be sorted out by an expert. A small residue is not to be recognized. A bone the sex of which cannot be told is more likely to be male than female. We may feel reasonably sure that it does not belong to a tall man or a short woman. There are exceptions to all rules. Here is a female scapula which both in size and shape is distinctly masculine, yet it came from a short and fat old woman with a short neck and high shoulders. It is perhaps relevant to state that she was insane; as it is thought that structural peculiaries are often found in the deranged.

The female humerus, radius and ulna show far more strikingly what I have called the general femininity of their structure, than the bones of the thigh and leg. Though I do not in this case speak by the book, that is by measurements, I believe that the difference of size is greater between male and female humeri than between the femora. It is generally thought that the female humerus is more slanting than the male, that is to say makes a smaller lateral angle with the extended and supinated fore-arm, but Berteaux's measurements make the difference too slight to be worth much. The articular ends of bone of both arm and fore-arm come to the rescue, but I regret that I have no series of measurements large enough to quote.

The Femur has rightly received much attention. It is a favorite of anatomists. I have, therefore, the advantage of valuable observations of others to compare with my own. I may in particular refer to the works of Humphry, Broca, Mikulicz, Charpy and Berteaux. The monograph of the last on the humerus and the femur is a mine of information. Leaving aside the length of the femur, let us take certain parts.

My observations on these details are founded on 64 cases, 38 men and 26 women, in which the body was measured before dissection and the bones studied in detail later. The length of the neck of the femur is on the whole in direct ratio to the length of the shaft. That of woman is therefore on the average the shorter, but there is no relative sexual difference worth noting. Berteaux has shown moreover that the relation of the thickness of the neck to its vertical breadth is the same in the two sexes. The angle which it makes with the shaft has long been a moot point. It has been taught that it is less (that is to say nearer a right angle) in shorter femurs, and if a short femur joins a broad pelvis, as in woman, by so much the more is the angle decreased and thus the angle is smaller in woman. This is diagrammatic demonstration which I long taught with perfect good faith. Of late years, however, it has been disputed by several observers, some even maintaining the reverse. My own observations, taken with others, convince me that there is probably no sexual significance in the angle (with one reservation to be presently set forth). The average in the two sexes is about the same, that of the women being indeed in my series a trifle the greater, thus in men 125.1°, in women 125.6°. Like every one else I find that there is a great individual variation, ranging from 110° to 144°. Be it noted by the way that the lowest is in a man and the highest is in a woman. But in the male bones there seems to be no regularity in the distribution of these variations. In man a long or a short femur is about equally likely to have a large or a small angle; but the shorter female ones tend to a lower angle. There is, therefore, this much truth in the old idea, that the shortest, but but I do not say the most typical, female femurs have angles below the average, as proved by the following observations. The average angle of the longer half of the male bones is 126.5°, and that of the shorter 123.6°,

while the longer and the shorter halves of the female series give 129.2°, and 121.9° respectively. It appears also that the highest angles of all are in the longest female femurs, but I doubt whether this connection is so regular as that of the short ones. This shows, however, that as a whole this angle is of little value as a sign of sex.

Another angle which has been thought to have more or less significance is that of the shaft with a vertical line, which according to the old theory should also be greater in shorter bones and wider pelves, and therefore associated with a smaller cervical angle. An analysis of my tables shows no system of relation between these angles. On the other hand the average inclination is a little less in the male than in the female, being 9.3° and 10.6° respectively. This is too small to be of any practical value, especially as the individual variation is very great.

Some other measurements seem to throw more light on this matter. They tend to establish the theory that the small size of joints is characteristic of woman. They are the greatest diameter of the head of the femur and the greatest transverse breadth through the condyles. The average diameter of the male head is 4.8 cm., that of the female 4.15. My tables show one marked difference between the sexes; namely, that in the women there is a fairly regular increase in the size of the head corresponding with the increase in length of the femur. Among the men this is not so. While it is true that most of the largest heads are found in the longer half of the bones and most of the smallest in the shorter half, the correspondence is far less evident. I find, moreover, that but two of the male bones have a diameter of less than 4.5 cm. and but two of the female a greater. Both these female bones were among the longest, but the two male were but a little below the average. Thus it would seem that the actual measurement of the head of the femur is a pretty good criterion of the

sex. The measurements of the knee are less conclusive. The average difference is just under one centimetre (8.3 and 7.3), but there are more that overlap.

Moreover there is a peculiarity in the shape of the typical male and female thigh bones which defies mathematical statement, which indeed I found very difficult to define long after I was aware of its presence. It is not merely that the typical female bone is more slender, as in fact everybody knows, but that seen from the front it has a peculiar outline. The shaft narrows gradually from the condyles till at, or above its middle, a part is reached that is narrower than elsewhere, above which there is a much less evident expansion. The typical male bone narrows much more suddenly from the condyles, so that the stout shaft soon reaches a tolerably uniform thickness. A rear view shows more distinctly that the male peculiarity seems to depend on the greater lateral projection of the outer condyle. Exceptions are plenty, but for all that there seems to be a pretty distinct difference of type, which with the help of certain measurements should enable us to determine the sex in most cases. I may mention that with the exception of a third trochanter (of the true kind) peculiar forms of femur are almost always male.

The tibia is in many respects a very variable bone. As a rule its greater delicacy of structure in woman is very plain. The smallness of the articular surfaces is striking. It is easy for an expert to judge rightly of its sex in most cases, though beyond the signs mentioned there is nothing absolutely characteristic.

While it appears from this discussion that there are certain mathematical considerations of great value in determining the sex, I would say emphatically that I consider the intelligent familarity with bones which develops what might almost be called an instinct, more trustworthy than hard and fast rules, resting on the dreary accuracy of statistics.

I have here bones from two widely different bodies which are interesting in this connection. One was an uncommonly good, even a graceful, figure of a young woman, were it not that the shoulders were somewhat too square and heavy. The bones are all remarkably graceful, though rather strong. The femur has the characteristic female outline. In spite of the comparatively heavy shoulders the scapulæ and humeri are distinctly feminine. The other was one of the largest and most powerful looking female bodies I ever dissected, except that the hands and feet were small. She had been a factory hand. The femur is an uncommonly powerful bone for a woman, but the small head, as well as its outline, suggests the sex. The bones of the upper extremity are evidently female. The slight development of the shoulders in women is therefore a recognizable feature in the bones. Contrast the bones of this large woman with those of a slight young man, of whom more later.

The Age.

The diagnosis of the age of bones (children not being considered) resolves itself into the study of processes occurring at three periods: first, that of late adolescence and early maturity; second, that of mature and middle life; and third, that of advanced age.

For the first period our guides are chiefly the union of the epiphyses, and that having occurred, the condition of the line of junction. I have not had the opportunity of making extensive observations at this age, but it is remarkable that so far as they go they all point one way, namely, to the earlier union of distinct parts than accords with the general teaching, and to the speedy disappearance of the epiphysial lines.

I agree with Topinard in looking on our knowledge as very unsatisfactory, but I cannot accept his provisional

table, which to my mind puts the dates of union much too late. The following table, giving the time of union of the epiphyses of the long bones compiled from English anatomies, is much better, but still wrong in the same direction.

From 16 to 18 lower epiphyses of humerus (except internal condyle) upper ends of radius and ulna, lesser trochanter of femur.

At 18 internal condyle of humerus, great trochanter.

At 18 to 19 head of femur, lower end of tibia.

From 20 to 21 or 22 head of humerus, lower end of radius and ulna, condyles of femur, lower end of fibula, upper end of tibia.

From 22 to 24 upper end of fibula.

My observations on a comparatively small number allow me to offer the following as a provisional chart from 17 on.

At 17 things are much as described as from 16 to 18, but perhaps a little more advanced. The lower end of the humerus is joined, excepting possibly the inner condyle.

Subsequently the process is more rapid, so that the epiphyses of the long bones are usually firmly joined to the shaft at 19. At this age the lines of union about the elbow and hip and ankle are nearly gone. At 20 all are indistinct or quite wanting. As for other parts, the basilar process of the occipital joins the sphenoid at the surface at from 17 to 19, the suture inside the skull being usually closed by 17. Once at 19 I saw the internal suture closed, but not the lower, and on section found a considerable piece of cartilage intervening. In another of the same age, which, however, was not split, there was no trace of a suture. The union of the pieces of the sacrum may be nearly finished at 17. The epiphyses of the crests of the ilia and of the posterior border and inferior angle of the scapula are among the last to unite. They probably join at about 21, but the lines of the crests of the ilia may be seen in parts for some years. As Topinard remarks, in-

dividual variations are many. I have several bones from a male skeleton which would seem much younger than those of others of both sexes of the same age. The fact is that this boy of 19, whose bones correspond very well with the usual statements, is the most backward specimen I remember. I think it is pretty certain that in the female the process is completed earlier. I do not agree with Topinard that it is completed earlier in the lower than in the upper extremity.

As I have had occasion to point out, the statements as to the time of the union of the different parts of the body of the sternum found in most text books are very far from correct, apparently having been copied and recopied. I am glad to find a great modification in the recent editions of the leading English anatomies. The union of the four pieces of the body begins from below, the fourth joining the third by 15 years or earlier. The union of the other parts of the body is completed by the age of 20. I have seen it completed at 16½ and at 19 (but not always). In a girl of 17 I have found the first piece of the body distinct, the others being united. I cannot distinctly remember ever having seen the body of the sternum of a white in more than one piece after 20, but once in a man of 46 the union of the first and second pieces of the meso-sternum had but just begun.

For the long succeeding period from maturity to marked decline three chief criteria may be considered, namely: first, the union of the different pieces of the sternum and the progress of ossification of the ensiform cartilage; second, the closure of the cranial sutures; and third, the co-ossification of the horns of the hyoid with the body.

The sternum having reached its normal condition of three pieces at 20 (and probably often earlier), the next change is the appearance of ossification in the ensiform cartilage, which may after this occur at any time and is no indication

of even middle age. This condition of affairs, namely, a meso-sternum in one piece, a distinct manubrium and ensiform, the latter more or less bony, usually persists throughout life. It exceeds fifty per cent. of my observavations on about 150 bodies. As these were on the average much above middle age, it is probable that this condition is even more common. In many cases the ensiform becomes one with the body. Though more frequent after middle age than before it, this is a sign of little value, for it is hard to say when this occurs. It rarely, however, begins before thirty. Union of all three pieces into one piece of bone is uncommon, occurring in less than 10%. This condition is probably dependent on constitutional tendency rather than on age, for in most of the cases which I have seen it apparently occurred before 50. I have met with it at 25 and at 28. Union of the manubrium and body with a free ensiform is even more rare than the last, of which it is presumably a preliminary stage. I may note as a sexual difference that the three parts of the breast-bone have a greater tendency to fuse in man than in woman.

The time of closure of the cranial sutures (by which I refer to the three great sutures of the vault) is very uncertain. Perhaps this simple statement would suffice, were it not that rules have been given to determine the age of the skull from the condition of the sutures. In 1890 I published my observations on 100 skulls. The process of co-ossification begins on the inside of the skull. It usually begins at about 30. The order and rate of closure are very varying. Complete closure may occur at any time. I have an instance of it in this thick calvaria of an epileptic black boy of 15. It does not necessarily depend on the thickness of the skull, for one of a girl of 20 in which they are all open is nearly as thick. Here is the calvaria of a woman of 52 on the outside of which the sutures appear open, though they are mostly closed within. The sutures may

be distinct or open in old age, but I consider an abnormally early closure much more frequent. Partially closed sutures alone do not indicate an age much above 30. Sutures absolutely open in most cases mean an earlier age.

My observations on the hyoid embrace among whites only 44 men and 20 women. The lesser horn is often rudimentary or wanting. It may be connected by either a joint or a ligament. Its union to the body by bone is uncommon, and when it occurs is a sign of advanced age. I have seen both lesser horns fused with the body only once before fifty, in a man of 31. Our chief guide is, therefore, the great horns. I have seen them both joined only six times out of 31 subjects under 45 (all but two of which had passed 20). After 45 years both are joined in more than half the cases. They may, however, be free in extreme age.

The general changes in the bones in later life are vague and ill-defined. The atrophy, which is often seen in the bones of the very aged, begins at no definite period. I have in my collection bones of persons over 70 which cannot even on section be distinguished from those of early maturity. In extreme age atrophy is, of course, to be expected.

The skull shows a marked atrophy of the face with an enlarging of the angle of the jaw, especially when edentulous. The cranium itself does not show the same wasting as the face, but on the contrary may be thickened. The idea that the angle of the neck of the femur is diminished is no longer held. The ossification of cartilage, the closure of sutures, increased roughness along lines of insertion of tendons, are often changes due rather to constitutional causes than to age. Their significance must be carefully weighed.

While I have felt justified in speaking with greater confidence on the determination of the sex than I did sixteen years ago, in the question of age it is just the reverse.

Asymmetry.

The question of asymmetry of the limbs requires brief mention. I have measurements of the separate bones of about 75 subjects, of which rather more than two thirds were male. As to the arm, the right humerus is almost always the longer, and the right radius usually; the combined length is almost always greater on the right. I find the average difference 6 mm. Rollet, who measured the bones of 50 male and 50 female subjects, puts it at from 7 to 8 mm.

As for the legs, the femurs differ about 2 mm., one side predominating about as often as the other, the tibiæ by some 3 mm., the left side being more often the longer. The combined length is greater on the left in distinctly more than half the cases, the average excess being from 4 to 5 mm. Rollet makes the differences somewhat greater and apparently finds that neither side is particularly favored. The two longer bones of a limb are usually on the same side, but not always. Wright's measurements on legs on the living and Garson's on skeletons, each gives the predominance to the left limb. My observations show an equality between the sides of the body that is greater than I had anticipated.

I may mention that incidentally to this investigation I have been able to carry some light where it is much needed, namely, as to the value of measurements on the living, but this is foreign to the present discussion. How far inequality of the central nervous system may be correlated with that of the limbs is one of those questions on which surmises far exceed exact knowledge. I have here the base of a female skull showing almost extraordinary asymmetry in favor of the left side, yet the bones of the right arm exceed those of the left by 1 cm., which though uncommon is hardly remarkable, and the bones of both legs are pecisely equal.

The Estimation of the Height.

If it be asked how far individual variations may affect our success in estimating the height, the answer must depend on the method that is employed. If we follow the best, or anatomical method, namely, that of putting the bones into proper position, making due allowance for soft parts and measuring the height, the individual variation does not count, because the problem is distinctly under the eye. But if parts are wanting so that we must turn to the method of calculating by proportions, individual variations are of the greatest importance. Indeed, they are so important that they make absolute certainty almost impossible. Should the legs be wanting we must turn to elaborate tables which I have calculated to enable us by multiplying the length of the spine from atlas to sacrum by certain coefficients for each sex, to obtain the height; sometimes with wonderful exactness. Still, not only does the length vary considerably, but the number of anomalous spines observed is increasing. Those with six lumbar vertebræ are common enough. My tables show that usually this increases the proportionate length of the spine, but not invariably. Thirteen and eleven thoracic vertebræ without corresponding decrease or increase in other regions are occasionally met with. Then we have the proportions reckoned from the height of the pubes, and finally from the separate bones. From large numbers of subjects measured in our anthropological laboratory, both before or after dissection, I selected forty, twenty male and twenty female, in each of which the humeri, radii, femora, and tibiæ of both sides had been measured. From these I calculated the height according to my own tables from the spine; according to the methods of Topinard, Rollet and Manouvrier from the humerus, radius, femur and tibia. The height may be reckoned from any one of these bones, but I have pur-

sued the method of taking the average length of the bones of both sides, and having found the height from each of humerus, radius, femur and tibia, to take the average of the four as probably the nearest approach to the true height. I have repeated this process according to the method of each of these three observers.

Not to stop for details, it appears that by almost any of these methods we can come within 2.5 cm. or 1 inch in about half the cases, within 5 cm. or 2 inches in about three fourths of them, which leaves one fourth remaining in which the error is serious.[1]

The Skeleton and the Figure.

What relation, if any, there may be between the shape of the bones and that of the body, is a very interesting question, which under certain circumstances may well become a momentous one. Can we from our knowledge of a person's figure predicate at least the general character of his bones, and conversely if bones are laid before us can we say anything worth saying as to the soft parts that once clothed them? Surely, putting aside extraordinarily tall or short or peculiar figures, the part we should expect to show the greatest individuality is the skull.

A typical long and a typical broad skull are of course readily distinguished. There are also typical long and narrow and typical short and broad faces, such as we can imagine belonging to the melancholy Trois Eschelles and the rollicking Petit André, the two hangmen in Quentin Durward. In the first the nasal opening is narrow and pointed, in the other broad and almost quadrilateral; in the former the jaw is narrow, the roof of the mouth highly vaulted, and the angle of the lower jaw more obtuse than

[1] This subject is discussed at length in a paper read before the Association of American Anatomists at Washington, May 30, 1894, which is to appear in the *Medical Record*.

in the other. But such typical faces are not very common. The characteristic points are usually wanting in clearness. Not rarely they are even transposed, so that for instance a short face may have the lower jaw with the angle of a broad one, and vice versa.[1]

Often when overcome by the intense weariness of a Faculty meeting, I have sought relief in asking myself which of my colleagues I should be able to recognize were their nicely macerated skulls set on the table before me. There are striking types of heads in that august assembly, but I am convinced that the skulls I could swear to would be very few. Even so characteristic a countenance as that of the sad-eyed Mongolian is not, when reduced to a skull, so strikingly evident that one will readily pick it out from a number. Most of the characteristics of a head and face, the size being excepted, are in the soft parts.

The problem may present itself in various ways. Supposing that we had the skulls of two known persons before us, the identification should in most cases present no insuperable difficulty. In many cases we could declare with absolute confidence that a certain skull could not have belonged to a certain person. But while I do not question that the careful and minute study of an expert can accomplish much, I am anxious to insist that the identification of a skull from our remembrance of a dead person, even with the assistance of photographs, is in most cases no easy task.

As for the rest of the body, it cannot be denied that our results are more negative than positive. The shoulder-blade is a very variable bone. I do not know what range of variation a great series of the scapulæ of the larger felidæ might present, but a small one shows nothing like that of the human race, I might add even that of the Caucasian. Yet I am quite unable to find any connection between its

[1] Formen des Ober und Unterkiefers bei den Europæern. Dr. J. Kollmann. Schweizerischen Vierteljahrsschrift fur Zahnheilkunde, 1892.

shape and the contour of the shoulders. The length, breadth, inclination and shape of the acromion are all valueless. Perhaps the only deduction that seems clear is that the leverage required by a long arm calls for a long scapula.

Conversely, however, I may say, that heavy shoulders indicate large humeri. In the strongest arm bones the spiral formation is particularly developed. I have often seen in this type a large, prominent, external supracondyloid ridge suggesting that of the gorilla. I have never seen this ridge strongly developed on a weak or on a female humerus.

The variations in the details of the femur are endless. I have been baffled in trying to find any definite connection between the figure and the various features of the thigh bone, such as length, or angle of neck, its forward inclination, and indeed the general characteristics of the shaft. I have been inclined to associate the length and forward inclination of the neck with a well marked lumbar curve, but have no evidence that can be called convincing. Two peculiar shapes of the thigh bone have of late received particular attention, one of which, called the pilastered femur, characterized by the prominent posterior ridge and usually strongly bent, is associated with a very narrow tibia. While I have often found this association, it is not invariable, neither does it always imply large muscular development. The other is the flattened femur, which, except for its greater length, suggests that of the gorilla. I have found it generally in very powerfully built men. I have frequently seen the bending back of the head of the tibia which, together with a facet at its lower anterior border, has in prehistoric skeletons been advanced as evidence that an upright position was not fully attained. The studies, however, of Mr. Arthur Thomson, of Dr. R. Havelock Charles and of Monsieur Manouvrier have shown that it is rather to be considered as associated with powers of excessive

flexion, and perhaps with the habit of walking with bent knees. These peculiarities are seen in the leg bones of Orientals who sit squatted on the ground. Here is a Chinese tibia which had the lower articular surface continued on to the front. It in no way implies in either case that the upright position cannot be assumed. I have frequently seen a lengthening of the articular surfaces of the head of the femur which is associated with these features, but I have found it independent of any of them. As to the thin tibia of prehistoric skeletons, we often find striking examples of it in the dissecting room.

To come to practical application, I do not believe that it is possible to predicate the shape of the bones from that of the body, nor *vice versa*, with any great certainty. Often we should fall into grievous error in attempting it. I have notes on two male subjects that were in the dissecting room at the same time, which I shall call A and B. A's height was 176.9 cm. (say 5 ft. 9½ in.). B was a mere trifle (6 mm.) taller, but with broader shoulders, broader hips and longer legs. My notes state that A was slender, thin, with a flat chest, rather long neck, thighs somewhat bent outward. B was of very powerful build, with square, thick shoulders, very deep chest, strong legs. B's shoulder-blade is the larger, but by no means strikingly so. Had I measured the arm bones I have little doubt that one factor of B's heavier shoulders would have been apparent. But the femurs were a surprise to me. Each is remarkably heavily made, and though of different types one would hesitate which to ascribe to the more powerful man. In A it approaches the pilastered form, in B it is broad and flat. Here again are some very interesting bones from a lightly made, almost puny blind boy of nineteen, who had spent nearly his whole life in an almshouse in a sedentary manner, yet they are distinctly strong bones. The humerus in particular presents a striking contrast to that of the female mill operative who seemed almost twice his size.

The Origin of Individual Peculiarities.

This carries us to the causation of peculiarities of structure. Manouvrier argues at great length that the very thin tibia comes from the great development of the tibialis posticus, and the pilastered femur from that of the cruræus, useful muscles for walking in a hard country and with bent knees. While I would be the last to question the tendency of the human body in common with all other organisms to adapt itself to its surroundings, I cannot regard such explanations as sufficient. Manouvrier mantains also that the third trochanter is associated with the action of the gluteus maximus. I have endeavored to show on a previous occasion that the theory which explains the shape of bone by mechanical strain is unsatisfactory. We find the third trochanter only in a certain proportion among savage races in which presumably every one lived pretty much the same life. We find remarkable instances of it in delicate bones which show no signs of great muscular development. Finally we find it in bones that are too young to admit of its having been pulled into prominence by the muscles of its possessor. Manouvrier argues that the platycnemic tibia is due to the mode of life of the individual from the fact that it is not found in childhood. This does not follow. At early adolescence many changes take place in the framework of the body, then beginning to assume its final shape, which can be accounted for by no mechanical cause. Such are the development of the nose and of the larynx at the time when, to quote Thackeray, the boy's voice ranges from an unearthly treble to a præternatural base. Moreover, we are not now concerned with the question how great races acquired their charateristics, but whether mechanical explanations will account for the individual peculiarities found among us. Here we see every variety of shape of femur and tibia, to say nothing of shoulder blades. Here are pre-

historic forms occurring in the midst of us. Here are the strongly developed bones of the blind boy who did nothing. I have spoken of the wonderful variability of the human scapula. There is every reason to believe that it acquires its permanent peculiarities at a very early period. Macalister has found characteristic differences in the acromion at from two to four years, and I have two tracings of the outline of peculiar shoulder blades made for me by Dr. Monks from two sisters, aged seven and ten. The resemblance of these two tracings and the early development of outline is strong evidence that this depends upon other than mechanical causes. Without questioning that external influences can and do modify the shape, I am convinced that the main characteristics of each body are largely hereditary and are predetermined from the very beginning of development.

The Significance of Anomalies.

I have met with most of the recognized anomalies of the skeleton, and with some of great rarity. Large third trochanters, supra-condyloid processes, supra-troclear perforations, I have seen galore. Here is a large para-mastoid process of the occipital bone, which is found in many mammals, especially in the herbivora and rodents; here is a sternum with the manubrium reaching to the third rib, as is found in gibbons; here is the fossa prænasalis, best developed in the seal tribe.

Our collection of anomalous spines shows many curious forms. It is claimed that man is about to lose one of his 24 præ-sacral vertebræ. I have specimens showing the sacrum encroaching on the lumbar region, transforming the vertebra above it into a transitional one and reducing to sixteen the thoracic and lumbar vertebræ, it may be at the expense of one region or of the other. I have instances of the reduction of the thoracic vertebræ to

eleven without any remarkable disturbance in any region. There are, on the other hand, cases of increase of the præsacral vertebræ. There may be twelve thoracic and six lumbars or thirteen thoracic and five lumbars. Here are cervical ribs of various degrees of development. This is a bicipital rib recalling the condition in some whale-bone whales. Here finally on a spine showing cervical ribs and the suppression of a thoracic vertebra, is an absolutely unique case of absence of the anterior arch of the atlas.

Much do we hear of atavism. Every anomaly is forced to represent something animal, a short spine is that of the orang, a long one that of the gibbon, one anomaly recalls the sloth, another the seal, another a ruminant, another a marsupial. In the muscular system we have been carried back both to birds and to snakes.

We cannot have inherited the fossa-prænasalis from the seal. If it be inherited at all it must be from some common ancestor. Following this line of reasoning, we find that if all animal resemblances are reversions, the primitive ancestor must have been a very curiosity shop of peculiarities, in direct defiance of that principle of evolution which brings from the simple the more complex. Convinced as I am that every bodily difference between man and non-rational animals is of degree and not of kind, I am astonished and perplexed by the great net-work of analogies extending throughout nature. No one can ignore them without wilfully shutting his eyes. But the very multiplicity of these resemblances assures me that some other law than that of heredity must be invoked to account for them. They cannot be represented by a tree-like figure. They spread out every way. The opinion is growing daily stronger, among serious scholars, that if man's body came from a lower form it was not by a long process of minute modifications, but by some sudden, or comparatively sudden, transition. The fabulous missing-link, once so accurately

described by Hæckel, is retreating to the limbo of worn out hypotheses.

The Vital Principle.

The phenomena of growth show unmistakable evidence of an immanent force presiding over the development of the living organism, essentially different from the forces of non-living matter. Its action is strikingly shown in anomalies; not, indeed, in their production, but in remedying the evil. If, for instance, there be but eleven thoracic vertebræ in a spine, it is impossible to say which one is wanting, for a slight modification is found to have taken place in several by which the symmetrical development of the spine is maintained. In the unique case of total absence of the anterior arch of the atlas, a strong ligament running from the odontoid to each lateral mass holds the bone securely and yet allows movement. By what purely mechanical process can this wonderful adaption have been brought about? One of the characteristics of living matter is that its growth is directed to the perfection of the organism as one whole, not as a collection of independent particles. This is the action of the vital principle, which science can no longer afford to ignore.

ARTICLE X.

ICHTHYOL IN GYNECOLOGY.

By MALCOLM STORER, M.D.
OF BOSTON.

READ JUNE 13, 1894.

ICHTHYOL IN GYNECOLOGY.

Sufficient time has now elapsed since the introduction of this drug to form some judgment as to its value in the treatment of diseases of women. While many foreign writers have given us the results of their experience, so little has appeared in this country on the subject that I feel justified in laying it before you.

Much, apparently with justice, has been claimed for ichthyol in other departments of medicine; the question of its value in gynecology has been somewhat vexed, and it may be of interest to give a brief resumé of the results of some other observers, and see how closely they are borne out by personal experience.

The characteristics of the drug generally employed—the sulpho-ichthyolate of ammonium—probably are well known to you. Suffice it to say that it is obtained from a fossil fish deposit, and is a thick brown liquid, with a smoky and to some a highly offensive odor. It is soluble in water, in a mixture of alcohol and ether, in oils, glycerine and fats, and contains about 15 per cent. of sulphur, very intimately combined.[1] Discovered by Schrötter,[2] it was introduced to the profession by Unna in 1883, and its success in certain inflammatory dermatological conditions soon brought it into great vogue. Unna's theory of its action was that by its reducing power it deprives the endothelium of the bloodvessels of oxygen, and so causes them

[1] Lurtigeau, Gaz. des Hop., 1887. p. 165.

[2] Schrötter, Monatschrift f. Prakt. Dermat., 1882.

to contract. While this view is vigorously combated, no better one has been proposed. (See Elliott.)[1]

Its use in Gynecology was first suggested by Freund in 1890.[2] He claimed surprisingly quick and complete cures in many cases of chronic parametritis, chronic and subacute perimetritis, with exudation and adhesions, cicatricial atrophy of the vagina and cervix, chronic metritis and tubo-ovaritis. He also found it valuable for pruritus and cracked nipples, and relieved a case of catarrh of the large intestine with suppositories. His method in severe cases was to introduce the drug into the system in a variety of ways, using all of the following:—sugar-coated pills containing 1½ minim, two to eight daily; salve, 10 per cent., for inunction on abdomen; rectal suppositories, containing three minims; ichthyol-glycerine tampons, five per cent.

He claimed, first, an extraordinary resorbent action, and secondly, great analgesic power. Subsequent investigators all admit its analgesic qualities, but that it also promotes absorption is as stoutly denied by some as it is maintained by others.

Following these lines, Reitmann and Schönauer[3] reported on its use in one hundred inflammatory cases, with most gratifying results as regards pain, remarking that the property of promoting absorption also deserves particular mention. Shortly afterwards Block[4] gave his results. He too was an enthusiast, and was the first to apply pure ichthyol to the endometrium. He was convinced of its resorbent as well as anodyne action. Great improvement was noticed in cases of acute vaginitis and chronic metritis with venous engorgement. That its effects were not due to the use of a glycerine solution he proved by a series of

[1] New York Med. Rec. 1887.

[2] Freund, Berl. klin. Wochenschrift, 1890, No. 11 and No. 49.

[3] Reitmann and Schönauer, Wien. klin. Wochenschrift, 1890, No. 23.

[4] Block, Wien. med. Wochenschrift, 1890, No. 50.

control experiments with pure ichthyol, and stated his belief that the pure drug was more efficient than the glycerine solution.

Kötschau,[1] in fifty-six cases of endocervicitis and endometritis, of one hundred and twenty-seven in which he used ichthyol, in the severer cases combined a preliminary curetting with the iron, massage and douches which he employed in addition to local treatment, and while treatment with other means gives about the same proportion of cures, he regards ichthyol as much safer. But when he speaks of it as a "sovereign remedy for endometritis," one must not be blind to the fact that many of the cases were previously curetted. In fifty-two cases of afebrile perimetritis he was satisfied that tampons of ichthyol-glycerine with ichthyol pills and hot sitz baths produced a cure more promptly than any other treatment, pain being often relieved by the first application, and the exudate quickly disappearing.

Thus far all testimony has been favorable. But in 1891 Oberth,[2] of Chrobak's clinic, from the study of forty-two cases, concluded :—

1. That the salve had absolutely no power of controlling pain.

2. That while the pills were usually, though not always, well borne, no improvement in appetite or general condition followed that could be ascribed to them.

3. That the suppositories had a negative effect as regards tenesnus, and that they sometimes irritated the rectum.

4. That while pure ichthyol applied to the catarrhal mucosa or eroded os would often produce a cure, the results were by no means as good as those obtained by the older astringents.

The only good of the tampons he believed came from the

[1] Kötschau, Mun. med. Wochenschrift, 1891, No. 1.

[2] Oberth, Wien. klin. Wochenschrift, 1891, No. 16.

glycerine they contained, and while granting a certain influence against pain denies absolutely any resorbent action.

Pee[1] arrived at the same conclusions, holding that it should be used only symptomatically for pain, and warning that its intra-uterine use might be followed by severe hemorrhage. In the discussion that followed his paper, Veit, Winter, Schaffer and Bokelmann coincided with the reader.

Egasse,[2] in 1891, remarks that in France the claims of Freund have not been substantiated, and that at Auvard's clinic it has been abandoned.

Jadassohn[3] used it in thirty-seven cases of gonorrhœa, using a one to ten solution, and regards it as more efficacious that even nitrate of silver in the acute stage. Similar good effect was observed by Bloch, but denied by Pee. Later, Columbini[4] and Jullien[5] reported its very successful use in this disease.

Herff[6] [7] is a strong opponent of its having other than excellent analgesic qualities. He discards its internal use as irrelavent, and the salve as merely a form of massage.

Hermann,[8] on the other hand, from one hundred and fifty cases in which ichthyol alone was used, either pure or in watery solution, finds that it has a distinct resorbent action, and even regards it as a sufficient means whereby to establish a diagnosis between carcinoma and inflammatory induration, as the latter is so quickly controlled by its use.

Schultz[9] thinks it of great value in chronic inflammatory conditions.

[1] Pee, Zeitschrift f. Geb. u. Gyn., 1891, No. XX.
[2] Egasse, Bull. de Ther., Paris, 1891, CXXI.
[3] Jadassohn, Deutsche med. Wochenschrift, 1892, 38.
[4] Columbini, Am. J. Obst., Ap., 1894.
[5] Jullien, Med. Week, Ap., 1894.
[6] Herff, Mun. med. Wochenschrift, 1891, p. 313.
[7] " " " " 1892, p. 941.
[8] Hermann, Centralbl. f. Gyn., 1892, 50.
[9] Schultz, " " 1893, No. 38.

Polacco,[1] from nine hundred and seventy-two cases observed in Mangiagalli's clinic, states decidedly that it is the most positive local analgesic known in gynecological therapeutics, and that furthermore it has an undoubted resorbent action in cases of pelvic exudates, and in a subsequent paper[2] he remarks that all authorities admit this. I have shown that they do not by any means all do so.

Albertolelli[3] practically had the same experience as the last writer. He regarded it as especially well adapted to intra-uterine injection, greatly preferring it to tr. iod.

At the risk of being tedious I have given a hint at most that has thus far appeared on the subject, chiefly to show that such opposed results could be obtained by observers employing much the same methods. Two years ago my interest in the subject was awakened, and suspecting that some of these results might possibly be biassed, I have tried to be entirely fair. While I greatly regret that I have not been able to follow all my cases as closely as desirable, from what I have seen I feel justified in drawing quite definite conclusions.

While of course occasional applications have been made in a much larger number of cases, it was used with more or less faithfulness in about one hundred and twenty, but as many of these were in the out-patient clinics at the Carney and St. Elizabeth Hospitals, owing to the exasperating irregularity of the attendance of the average out-patient as soon as somewhat relieved, it would be impossible to say just which cases deserved to be included in tables, so I will attempt no statistics, but merely state the impressions I have drawn from its use.

Without going into the finer distinctions of pelvic pathology, I would say that in cases of moderately acute pelvic

[1] Polacco, Centralbl. f. Gyn., 1891, No. 50.

[2] Polacco, Am. J. Obst., Ap., 1894.

[3] Albertolelli, Am. J. Obst., Ap., 1894.

inflammation, with much pain, but where an operation did not seem indicated, or where one if advised was refused, the method pursued was as follows :—Every third day after carefully drying the vagina, its vault was freely painted with ichthyol-glycerine, 10 per cent., or with pure ichthyol, followed by a pad soaked in the solution, which in turn was guarded by a dry pad to protect the clothing. In addition to this, full hot douches were sometimes employed. Some cases where they were not used improved quite as rapidly as the others. In perhaps a dozen cases ichthyol pills were given. No discomfort from them was noticed, except one or two dyspeptics complained of the taste of the eructations. Von Nussbaum took fifty pills a day with no bad effects. Baumann says that doses of from three to five drachms daily cause merely copious watery discharges. On the other hand I cannot say that any of the patients taking the pills seemed materially the better for them. In nearly all the appetite improved, but this may have been due to improvement in the general condition. In six cases of deep seated pelvic pain the ointment was tried, and possibly the very slight but positive relief that was observed may have been due to massage.

In a number of cases I used a suppository containing ℥ iii. which was allowed to dissolve in the vagina every night, with very satisfactory results, and now I frequently order them. Care should be taken that in such suppositories the drug is thoroughly mixed with the vehicle, and not merely enclosed in a capsule as is a favorite practice in France. I regard it as distinctly undesirable that the pure drug should be used for any length of time without the physician's control.

Looking back on this class of cases, I can only say that they seemed to improve faster than where other methods were employed. The relief to sharp pain was fairly constant and immediate, and in a few cases a single application

gave almost entire relief. To be sure, sometimes a single painting with some other drugs has a very prompt action, but I do not think quite so often. Dull aching pain was not so easily reached, but it was the exception that some relief was not experienced after a number of applications. I found rather better results to follow the use of the pure drug than did that of the glycerine solution, although care had to be taken not to desquamate the vagina—a result which sometimes follows also the over-enthusiastic use of tr. iod.

Admitting its anodyne effect, the following case will show that it also sometimes has a resorbent action :

E. R., first seen Sept., 1892. Twenty-five. Married 8 years. Two children, the youngest five. Neither labor instrumental, but a somewhat long puerperium after the last. Since then three miscarriages. Has not been well since the last miscarriage in March, 1892.

Three weeks later had an offensive discharge for a few weeks. Early in July had an attack of severe abdominal pain, and a pelvic abscess was opened by the vagina, but soon allowed to close up. A month later had a return of the pain, amounting to agony when the bowels moved. Catamenia were fairly regular, but not marked by any great increase in the pain. When first seen she was in good general condition, except for a slight afternoon rise in temperature. The posterior vagina and both sides of the pelvis were filled by a very hard board-like mass, in which nothing definite could be made out. In fact its hardness was such that a previous examiner had been led to make the diagnosis of malignant disease. There was exquisite local tenderness. The patient was put on applications of thiol, which is practically the same as ichthyol, alternating with the latter, with hot douches, which she had been taking previously. After ten days' treatment the mass was much softer and less tender, and the pain had vanished. Defecation even was now painless. After a month the uterus was easily felt anteriorly, and it was fairly movable, while to the left and posteriorly was felt a soft, enlarged and fluctuating tube, and behind the uterus a tender and indurated ovary closely connected with a hard mass filling the right pelvis. Improvement continued under treatment, and the patient was subjectively perfectly well until September, 1893, when the old symptoms returned, and the pelvis was again found filled with exudate. This time the pain was controlled by a single application, and a week

later the anatomical condition was much improved. In October catamenia lasted longer than usual, but the patient said she had never felt better in her life. By December there were only traces of exudate left, and what fluid the tubes previously contained had now been evacuated. Douches were not used in this last attack, yet improvement was quite as rapid as in the first.

This good result was by no means unique. Very possibly there would have been equally prompt relief under other treatment, but I have seldom seen cases like it do so well when other treatment has been employed.

Cases of chronic endometritis seen at comparatively long intervals were treated with pure ichthyol applied to the fundus, after a preliminary partial disinfection with lysol or creolin, and the relief from local pain and dragging was constant, and generally there was in a short time much less leucorrhœa. Of course very many obstinate cases finally came to curetting, but my impression is that as many, if not more, were cured or relieved than were by any other treatment. In no case was there any real pain from the application, *i.e.* that was not merely due to the passage of the applicator, or to the preliminary slight dilatation. It is to be remembered that cramps following the intra-uterine use of iodine are by no means rare. Pee spoke of hemorrhage sometimes following the intra-uterine use of ichthyol. I have not seen any such immediate effect, but in two cases the following catamenia were prolonged much beyond previous experience, an effect which had not followed the previous use of iodine, nor, on the other hand, had much improvement. Both these cases were subsequently practically cured by ichthyol. I have in mind several other cases previously treated by other gentlemen by the ordinary means which were promptly cured by ichthyol.

In packing adherent retroverted uteri it has been my custom to dip the first two pads in the ichthyol-glycerine solution. I am convinced that since I have done so I have

seen many such uteri loosen up and become replaceable that otherwise would have been very obstinate. Another advantage is that it being decidedly inimical to many forms of bacterial life, as shown by Fessler[1] and Abel,[2] when such a packing is removed it is much less offensive than the ordinary glycerine pack—except, of course, for its characteristic ichthyol odor. Here let me say that I have never had a gynecological patient complain of its odor. Purely as an antiseptic its value is not very great, but prolonged immersion in the pure drug destroys streptococci.

In erosions naturally the chief attempt has been to remove the cause, but in the cases where intra-uterine treatment was not adopted there was improvement, although perhaps no more marked than under other treatment.

I have not tried it in enough cases of gonorrhœa to form any opinion as to its value. In four the few times it was applied was followed by little result, while in a fifth obstinate case the very free leucorrhœa almost stopped after six applications to the endometrium, combined with daily lysol douches. To which is due the credit I am not certain. Lately it has been used quite extensively in the male urethra. I tried it in one case of female urethritis with no effect that I could see. This case promptly improved with nitrate of silver. The results of Bloch, Jadassohn, Columbini and Jullien warrant further experimentation in this direction.

I have used the salve and the pure drug in a number of cases of pruritus of the vulva and anus. There was improvement, but no cure in all. One severe case was painted extensively with a solution in collodion (1-8), and after the somewhat natural stinging had vanished relief was complete for some time.

[1] Fessler, Klin. exper. Studien. uber chir. Krankheiten.

[2] Abel, Centralbl. fur Bakt. u. Parasit., 1893, XIV., No. 13.

In a few cases of painful hemorrhoids it seemed to relieve the discomfort by lessening the congestion.

The use of the collodion solution is most satisfactory in cracked nipples.

Conclusions.

1. While ichthyol is by no means the gynecological panacea that some observers have claimed it to be, still it has sufficient approved value to deserve a very high place in our list of remedies.

2. That while its chief action is to relieve pain it does possess certain resorbent qualities, which in some cases are relatively powerful.

3. That its use is unattended with danger or discomfort.

4. That the use of the pure drug is generally more satisfactory and reliable than that of solutions.

5. That it has not yet been proven that it has any gynecological value other than as a local application.

Articles on the subject not referred to are:

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ARTICLE XI.

CHRONIC INFLAMMATION OF THE SEMINAL VESICLES.

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READ JUNE 13, 1894.

CHRONIC INFLAMMATION OF THE SEMINAL VESICLES.

I FEAR the title of this paper may suggest the idea of rare and obscure disease in an inaccessible situation, of interest only to specialists; but I hope to be able to show that we have within reach a means of interpreting many puzzling symptoms in a large and important class of cases.

The apparent indifference on the part of the profession at large, and even of specialists, toward the vesiculæ seminales is suprising, and it is only within a few years that they have begun to attract in some degree the attention they deserve. Mr. Jordan Lloyd of Birmingham, England, in 1889, was the first to give them full recognition, and to demonstrate their importance when diseased. In Gouley's "Diseases of the Urinary Apparatus" a chapter is mainly devoted to the subject, which is particularly valuable for its exposition of the anatomy, physiology and pathology. About a year ago Dr. Eugene Fuller of New York read an article which gives a more complete and detailed description than any other that has yet appeared of vesicular inflammation, and especially of its treatment, which he has developed and put on a practical basis.

It may be well to recall a few anatomical points: "The vesiculæ seminales are two irregularly convoluted tubes lying one on each side of the under surface of the male bladder. . . . . They vary greatly in size, . . . but average perhaps two inches in length as they lie on the bladder. If dissected off and straightened out they are found to be two or three times this length. . . . . The

vasa deferentia pass . . . along the inner sides of the two vesiculæ, and unite at an acute angle with the ducts of the seminal vesicles to form the common (ejaculatory) ducts. Just before this union takes place each vas deferens widens out into a tortuous sac or 'ampulla,' which closely resembles in structure the seminal vesicle itself." (Thorndike.)

Inflammation of the seminal vesicles, variously called spermatocystitis, gonecystitis (Gouley), and seminal vesiculitis, is analogous to salpingitis, that is to say the vesicles, according to Lloyd, are the analogues of the Fallopian tubes. It is rarely, if ever, a primary affection. It is almost always secondary to urethritis, generally gonorrhœal, or may be, though rarely, secondary to tuberculosis or malignant growth in the vesicle. It is commonly, but not necessarily, present in cases where there is or has been epididymitis.

Acute inflammation is almost always of gonorrhœal origin; it is similar to epididymitis in a general way, and rarely suppurates. The symptoms are substantially those of acute prostatitis: local pain and heat, spasmodic contraction of the perinæal muscles, etc.; and this has probably led to mistaken diagnosis in many cases.

But it is the more common and more important chronic inflammation that we have now chiefly to consider. It may result from the acute form just mentioned, but is usually chronic, or at most sub-acute, from the beginning. In this case the source of the trouble may be gonorrhœal prostatitis or cystitis, or a posterior urethral catarrh resulting from congestion of the prostatic portion, brought about by prolonged and repeated sexual excitement.

In chronic vesiculitis we have a train of symptoms commonly enough observed and not always peculiar to this affection, and therefore generally attributed to other causes. There may be a chronic urethral discharge with shreds in the urine; or vesical irritability with frequent micturition,

not always present and often slight, but sometimes more marked, with urine more or less turbid and containing shreds and clumps of pus and blood. In a large majority of cases there is some disturbance of the sexual function, showing itself by the presence of one or more of the following symptoms: deficient erectile power, with or without diminished desire, spermatorrhœa, frequent emissions, occasionally hæmospermatism, viscid discharge from the meatus at stool, and the various local subjective sensations as well as the general nervous and mental symptoms peculiar to sexual neurasthenia. A burning feeling in the perinæum and along the urethra is one of the more common of the subjective sensations. Spermatic colic, a pain in the region of the vesicle due to occlusion of the duct, and sometimes accompanying ejaculation during coitus or an emission, is an occasional symptom.

It might seem that with symptoms so varied and not wholly characteristic the diagnosis would not be easy, and in fact it can only be made by rectal examination. When a sufficient number of examinations have been made to thoroughly familiarize one's self with the topography of the region under varying conditions, the diagnosis is not difficult in a well marked case. The vesicles, or at least their lower parts, are usually within easy reach of the forefinger, though in some cases they are more difficult to get at. The patient, with a moderately full bladder, should stand with the body bent to a right angle at the hips, with the knees straight, the feet spread apart and the hands resting on a chair. The forefinger is passed slowly and gently through the anus and over the prostate, which should be examined, and its condition noted as to size, form and consistency. According to my experience it is rather small in a large proportion of these cases. Just beyond the lateral lobes of the prostate, lying in the sulcus between it and the distended bladder, and extending obliquely outward and

backward toward either side, are the seminal vesicles. The examination is aided by exerting counter pressure with the free hand over the inguinal region of the side which is being explored. It is further aided, in cases where the vesicles are difficult of access, by placing the foot corresponding to the examining hand on a chair and bracing the elbow against the knee; in this way considerable force can be exerted by which to overcome the resistance of the perinæal muscles. When normal, the vesicles are soft and scarcely appreciable to the touch, sometimes not at all. But when diseased they are plainly felt. One or both may be affected. Sometimes they are nodular and indurated, resembling somewhat a twisted and knotted cord. Again they are much distended and form smooth, rounded bodies, which on palpation are felt to contain fluid. In the latter case the vesicle is often so closely attached to the prostate as to be easily mistaken for it; that is, it seems to form the posterior border of the lobe on that side; but with care fluctuation can be detected and a line of demarcation between it and the prostate can be made out, similar to the line of demarcation between the testicle and epididymis in acute inflammation of the latter organ. Sometimes the vesicles are much enlarged and dilated, but not distended, and form soft fluctuating sacs. Gouley speaks of shrivelling of the vesicles, generally associated with prostatic enlargement; but a diagnosis of this condition could hardly be made during life.

In acute inflammation, of course, the swelling is greater, the perivesicular tissue being involved; it is diffused, doughy and hot, and is extremely sensitive to the touch. The sensation in the chronic affection varies in different cases. Sometimes there is decided pain and tenderness on pressure, but it is usually not marked unless the finger bears down quite hard; it is more commonly described as a disagreeable sensation and occasionally causes faintness.

Sometimes there is only slight sensitiveness even on firm pressure. By means of this pressure the contents of the vesicle are emptied into the deep urethra, and if in considerable quantity will ooze from the meatus, and will in any case appear in the urine passed after the operation. The fluid thus squeezed out varies in different cases from a thin liquid resembling skimmed milk to a thick gelatinous substance sometimes containing inspissated particles, and appearing in the urine in the form of clumps and shreds. Microscopic examination of the thin fluid shows only a little epithelium and a few dead spermatozoa; the thick substance often seems to consist of masses and bands of fibrinous material, entangled in which are sometimes a few, sometimes great numbers of motionless spermatozoa. When normal vesicles are squeezed nothing will appear, except, perhaps, a very slight turbidity of the urine.

With respect to prognosis, it must necessarily, a few years ago, have been regarded as decidedly unfavorable. But owing to recent progress in treatment, although more extensive data than are now attainable will be required before a reliable opinion can be formed as to chances of complete recovery, it is already safe to say that improvement may be expected in a majority of cases.

The treatment is simple, but requires a good deal of judgment, chiefly to avoid overdoing. It consists in pressure with the end of the forefinger, reaching as far up toward the free end of the vesicle as possible, and then stripping it down toward the duct. In this way the abnormal secretions are removed, and are not allowed to accumulate. Sometimes the ducts are obstructed by inspissated material or by concretions called sympexia, and several treatments are necessary to clear them; or a sound may be passed into the bladder and the vesicles pressed against it, as advised by Gouley, the obstruction being in this way more easily dislodged. The danger in overdoing the treatment is of

bringing on an acute exacerbation by too active manipulation, which I was unfortunate enough to do in one of my first cases. As some patients are much more susceptible to reaction than others, great caution should be observed at first, only gentle pressure being used and the effect carefully watched. As to frequency of the sittings, Gouley recommends daily treatment, but Fuller thinks it should not be repeated oftener than once in four days. The effect of the treatment is not, as a rule, immediately apparent, although in some cases marked improvement is soon noticeable. It is generally necessary to keep it up several weeks, sometimes even months, before the vesicles are restored to a normal condition. This is brought about by keeping them empty until their muscular walls recover their tone and they are able to properly carry on their functions. This process is appreciable to the physician in a gradual decrease of the swelling and softening of the induration, until after a while the vesicles apparently disappear; that is, they become as difficult to feel as in the normal state. At the same time the sensitiveness steadily diminishes and the amount of fluid expressed grows constantly less until there is no more. I have noticed also, in a few cases, that the prostate, which is necessarily massaged more or less during manipulation of the vesicles, has undergone a considerable change, increasing in size when atrophied, and assuming a more nearly normal consistency. In the course of the treatment a gradual improvement in the general health and in the nervous condition, or a diminution in the frequency of emissions, or, in general, an abatement of whatever symptoms secondary to the disorder have been prominent in each particular case, may be looked for. No medicinal treatment is required unless indicated by special symptoms.

Since the latter part of January, when, through Dr. Fuller, whose methods I have closely followed, I became

especially interested in this subject, I have examined seventy-four cases with reference to the condition of the seminal vesicles; all being cases in whom there was reason to suspect that disease of these organs might exist. In fifty-five, a more or less abnormal condition was found, both vesicles being affected in thirty-eight of them. In two cases the trouble was acute, in three sub-acute, and in the remainder it was chronic. In the acute cases, in two of the sub-acute, and in thirty-one of the chronic cases, there was a history of gonorrhœa. Of twenty-three cases, all chronic, in whom I have been able to follow up treatment sufficiently long to get definite indications of its effect, there has been improvement in nearly all. In a few it has been marked and speedy, some having practically recovered; in the majority it is still too soon to give final results, while a very few have been disappointing.

Since this paper was written I have had the pleasure and advantage of hearing a very exhaustive article on the subject by Dr. R. W. Taylor of New York, who at the same time showed by means of an anatomical specimen that the vesicle is so convoluted and doubled on itself in such a way that stripping the organ with the finger toward the duct would empty only a portion of it, together perhaps with the vas deferens. He believes that the dilated portion or ampulla of the vas deferens is often mistaken for the vesicle. He is, in fact, somewhat sceptical as to the efficacy of the treatment by pressure. However this may be, it is certain that the large amount of fluid squeezed out and the progressive diminution in the swelling observed in many cases show that the pressure has been effectual. In view of these facts, which seem to be not wholly consistent, a few considerations suggest themselves:—

1. The fluid in a distended vesicle, subjected to pressure, would escape at the point of least resistance, which would be the natural outlet, no matter how tortuous, unless

the wall of the vesicle were ruptured by violence. Simple pressure on such a blind sac would seem better than an attempt to strip the vesicle down toward the duct.

2. The slow and unsatisfactory progress of a few cases may be due to the difficulty of emptying such portions of the vesicle, which may in these cases be the chief seat of disease.

3. In some cases the ampulla of the vas deferens may alone be affected, when the stripping process would be easy and effectual.

4. Disease of the vas deferens may possibly be of more importance than that of the vesicle itself, obstructing, as it does, the direct road from the testicle.

5. Simple massage of the vesicles may play an important part in the treatment.

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ARTICLE XII.

THE FREQUENCY OF PUERPERAL SEPSIS IN MASSACHUSETTS; ITS DIAGNOSIS AND EFFICIENT TREATMENT.

By EDWARD REYNOLDS, M.D.
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READ JUNE 13, 1894.

THE FREQUENCY OF PUERPERAL SEPSIS IN MASSACHUSETTS; ITS DIAGNOSIS AND EFFICIENT TREATMENT.

At the time when I promised to prepare a paper for this meeting, I had been much interested by statistical reports of the frequency of puerperal sepsis in England and in New York state; and as such cases are always sufficiently common in my consultation practice to convince me that deaths from this cause are only too frequent here, I had thought that a report upon its frequency in Massachusetts would be of interest; but on consulting the only sources from which such statistical information can be obtained, that is, the reports of the City and State Boards of Health, I found this cause of death reported with so surprising an infrequency that I was obliged to conclude that the profession had not put it in the power of these Boards to make an accurate and reliable statement on this point. I found, for example, that if I were to believe in the accuracy of the reports, I should be forced to conclude that I, personally, had seen in consultation during the year 1893 almost one-fourth of all the fatal cases of this disease in this city of half a million inhabitants. Such an hypothesis is manifestly absurd, and I am regretfully forced to abandon any attempt at estimating the frequency of septic disease among us and to confine myself in this paper to the question of its diagnosis and treatment.

I am the more ready to limit myself thus on account of the importance of these points, and because the experience

which I have gained from consultation practice convinces me that a great many of the profession fail to recognize the all-important therapeutic distinction which exists between sepsis in its early or localized stage, and sepsis which has been allowed to reach the point of constitutional infection. In illustration of this point I wish to quote the results of thirteen cases of puerperal septic disease which I have seen in consultation since Jan. 1, 1893, as compared with the fifteen cases which occured under my charge in the Out-Patient Department of the Boston Lying-In Hospital during the year 1893.

In five of the thirteen consultation cases I was called while the disease was still localized in the uterus, and under prompt treatment all five made prompt recoveries. In two the disease was advanced, but had localized itself in the pelvis as pelvic abscess; under surgical treatment one made a fairly prompt, the other a very slow recovery. In six cases constitutional infection was marked, without localization of the disease in the pelvis; of these, one recovered after an exhausting illness and the other five died, a mortality of 38½ per cent. of the whole number, and of 83½ per cent. of the late cases.

The contrast between this record and that of the hospital is very marked. During the year 1893 there were fifteen cases of sepsis among the 1352 out-patients of the hospital.[1] Of these fifteen cases, one refused treatment, was under the care of some physician, to me unknown, for the succeeding five or six days, and was then sent into the City Hospital in a state of such advanced constitutional infection that she died in spite of the most energetic treatment. Of

[1] Under the methods of the present day septic disease has become extremely rare in the wards of the institution. Even in the Out-Patient Department, in which the worst fed, worst lodged, and most filthy of the community are attended under the immediate care of a constant succession of inexperienced men, a careful supervision of their work has reduced the number of cases of sepsis to fifteen in a total of 1352 cases confined during the year 1893, a percentage of sepsis of 1.1 per cent.

the fourteen consecutive cases who submitted to the treatment recommended, not one died.

The practitioner is too apt to be unwilling to diagnose sepsis in his own cases, he is too prone to shut his eyes to the possibility of infection, to adopt every other explanation of the condition of the patient, and admit the existence of sepsis only after it has reached the incurable stage. Those who are in the habit of believing that the slight disturbances of health and temperature, which either constitute mild sepsis or herald the approach of grave sepsis, are due to milk fever, nervousness, excitement and other indefinite ailments, do not recognize the fact that under strict asepsis the convalesence from labor is always perfectly smooth and unattended by any elevation of temperature, unless some definite entity of intercurrent disease is present; that the mild disturbances which are frequently seen must therefore be considered mild sepsis, and that it is seldom possible to say in advance that they are not the initial stages of a severe attack. Every rise of temperature or disturbance of the health during the puerperium is not, of course, due to sepsis, but every such disturbance should be considered sepsis until some other cause can be established to account for it.

After labor, the first, or first and second temperature may be high as the result of fatigue, but the subsequent temperatures should be between ninety-eight and ninety-nine, and when any rise above the latter figure occurs its cause should always be investigated. It may be due to disturbances in the breasts, constipation, intercurrent non-obstetric diseases, or sepsis, and when any such slight disturbance of the health of the puerpera arises the differential diagnosis between these conditions should always be carefully made.

Slight disturbances in the breast may account for considerable elevations of the temperature, but the condition of the breast should not be permitted to account for the disturbance unless the intrinsic symptoms of sepsis are absent,

nor if relief of the mammary disturbance is not followed by a prompt subsidence of the temperature.

Constipation should not be allowed to occur, but if the bowels have been inactive before the appearance of the rise of temperature, they should be promptly and thoroughly opened; when any elevation due to this cause will at once disappear, and any disturbance which remains must be accounted for in some other way.

Intercurrent non-obstetric diseases must be excluded by a careful physical examination of the patient as a whole. Among the most common are malaria, pneumonia, tonsillitis, and exacerbations of pre-existent, latent, inflammatory troubles in the pelvis. Malaria can only be established by a careful exclusion of sepsis; or by the existence of repeated chills which recur at regular intervals, are out of proportion to the constitutional disturbance and are followed by feverishness and a return to comfort after a short interval. There should, in short, be as much symptomatology to establish the diagnosis of malaria in the puerperal state as would be required at any other time. Malaria is a convenient excuse and it is too common to see a diagnosis of malaria admitted *pro forma* and without any careful consideration of the condition of the patient. Pneumonia should be diagnosed only by the presence of the well known signs or physical examination of the chest, and not by the presence of cough and hurried breathing, which are not infrequently mere reflexes from the pelvis. I have twice been called in consultation to see cases in which the puerperium was said to be complicated by pneumonia, but in which the real condition was an acute purulent salpingitis, and in which all pneumonic symptoms disappeared after the tubes had been emptied of pus. Tonsillitis is to be excluded or established by examination of the throat; local pelvic inflammation by the ordinary bi-manual examination of the pelvis, and the other less frequent non-obstetric diseases by the absence of their characteristic symptomatology.

It should never be forgotten that even if one of these diseases is actually present it may still be complicated by sepsis; that none of them are competent to produce the symptomatology of sepsis; and, finally, that when the temperature of the puerpera is disturbed, in the absence of definite ground for a diagnosis of some other disease, the probabilities are in favor of the existence of sepsis.

The early diagnosis of sepsis rests mainly on the physical signs which can be gained by examination of the patient. The symptomatology of obstetric sepsis is commonly described as consisting of an elevation of temperature, a decrease in the lochia and milk, some decrease in the other secretions of the body, foulness of the lochia and abdominal distension and tenderness, which latter is most marked over the fundus of the uterus; but this description is of little value today. He who fails to diagnose sepsis, when such a symptomatology is presented to him, is ignorant of the rudiments of his art; while he who must wait till this symptomatology is present, is unable to diagnose sepsis at a time when his diagnosis is of any great value to his patient; for this group of symptoms is the symptomatology of constitutional infection, and when this is present the disease has passed beyond its early and curable stage, the physician has failed in his duty, and the patient is in an extremely dangerous, if not hopeless state.

To take up these symptoms in detail. The decrease of the milk and other secretions only comes on after constitutional infection has existed for some days, and this symptom is therefore seldom or never present in the curable stage of the disease. Decrease in the quantity of the lochia is apt to come on late, and should not be waited for. Foulness of the lochia is usually present at a tolerably early stage, but is not a reliable guide, since it sometimes does not occur until during the latest stages, and on the other hand may be extremely marked as a result of external de-

composition of the lochia, when there is little or no true sepsis present.

The odor of sepsis is, in fact, dependent on the presence in the lochia of the comparatively harmless bacteria of decomposition, and is not produced by pure infections of the more dangerous pathogenic forms. I have repeatedly seen cases of serious septic disease in which the uterine secretions yielded pure cultures of streptococci, staphylococci, or the Klebs-Loeffler bacillus of diphtheria, in spite of an entire absence of odor in the lochia.

There is little left, then, of diagnostic value which can be obtained during the promptly curable stage, except uterine tenderness, the other characteristics of the uterus shortly to be spoken of, and the course of the temperature. These symptoms must then be carefully considered. Much may be gained by a careful study of the temperature, which should, therefore, always be plotted on paper, during every convalescence from labor. Septic infection may originate during labor, or at any period during the first eight days thereafter, but its pyrexia appears most commonly on the third, fourth or fifth day. When the temperature rises suddenly from the normal point to above 101°, with or without a chill, and is accompanied by but little uterine tenderness, the pyrexia is usually not symptomatic of sepsis; but when such a rise is due to septicæmia, the case is always one of extreme virulence, and is likely to be promptly fatal. Such infections can only occur from the introduction into the system of a large quantity of pathogenic bacteria, and are to-day infrequent. Any case which presents such a rise should be visited with great frequency till the observer is either able to establish the presence of some other disease as a cause for the pyrexia, or till either a rapid increase in uterine tenderness, or the appearance of a foul odor enables him to diagnose the presence of this very dangerous form of septicæmia, which has been well named by Garrigues, septicæmia acutissima.

When this fortunately rare form of septicæmia is present there is but little hope for the patient, and that little consists in the adoption of the most radical measures of treatment at the earliest possible moment. The onset of the more ordinary forms of sepsis is, on the other hand, usually accompanied by a gradual and insidious elevation of temperature such as is shown in the chart which I pass about. It is, then, these gradual and not excessive rises of temperature which are most suspicious of sepsis, and when such a pyrexia is attended by a recurrence of uterine tenderness or by an undue prolongation of that which is so often seen immediately after labor (or by any foulness of the lochia), it is sufficient reason, in the absence of other symptomatology, for a physical examination of the genital tract. This is, if aseptically performed, a harmless procedure, and, if the reason for it is boldly explained to the patient, will never be objected to by her.

The vagina should be exposed and its surface searched for the so-called pseudo-diphtheritic gray patches, and this is best done by a Sims' speculum, the only one which thoroughly exposes the vaginal walls. The surface of the cervix and such portion of the cervical canal as is visible, should at the same time be especially carefully searched. If no such patches are found, the cervix should be seized with a pair of double hooks and a small swab of sterilized cotton should be passed into the interior of the uterus, and withdrawn covered with uterine lochia. The odor of this should be carefully noted, since the uterine lochia may be foul while the vaginal secretions are still uninfected. If no odor is discovered, the sterilized cotton may be put into a sterilized test tube and reserved for a bacteriological examination, if the conveniences for this are at hand. The patient should be turned upon her back and a bi-manual examination should be made. The size, consistency and tenderness of the uterus should now be noted, since sub-

involution, undue softness and tenderness of the fundus and an undue patency of the os, are characteristic of the infected uterus. Finally, the region of the broad ligaments should be carefully palpated in the search for acute inflammatory conditions in their substance.

If gray patches are found in the vagina or on the cervix, but the uterus is of sufficiently firm consistency and small size to correspond to the period of the convalescence at which the examination is made, the gray patches should be thoroughly powdered with iodoform, and the physician should wait until the following day before invading the uterus. If, then, the patient is improving, the treatment should be repeated daily till the gray patches disappear. If, in the presence of an infected vagina or cervix, the uterus is soft, flabby and over-large, with a widely open os and markedly tender, it is generally safe to infer that its cavity is already infected, and the treatment must be directed primarily to it.

When infection of the uterus has been diagnosed it may be treated by intra-uterine douches of an antiseptic solution, by placing iodoform bougies in the uterine cavity, or by these in combination with the use of the curette. The first two remedies have long been popular, but even the repeated use of intra-uterine douches is often ineffective, and they are never free from danger. Indeed, he who has once adopted the use of the curette and has learned by experience the amount of foul debris which can be removed from the infected uterine cavity, will, of necessity, soon give up the idea that the mere washing of its surface with corrosive sublimate can be a measure of any considerable value.

The use of the curette is attended by two dangers,—first, an incomplete removal of the debris leaves a fresh wound in direct contact with septic material; but it has been shown by experience that this danger can be avoided by thoroughness in the use of a good technique. Second,—the walls

of the puerperal uterus are of soft consistency, and might undoubtedly be perforated by a sharp curette in the hands of a careless operator; the uterine muscle is, however, so much more firm than the infected decidua which covers it, that the difference is instantly appreciated by the touch; and while the operation is not one which should be recommended to those who are entirely unskilled in instrumentation, it is one which is within the capacity of any one who is possessed of even an average degree of surgical tact; as is shown, I think, by the facts that I have, for years, taught this operation to all my house officers at the Lying-in Hospital; that, in the majority of our cases, the curettage of the uterus has been done by them, under my supervision; and that no one of them has ever had an accident.

The curette used should have a large blade, in order to make it easy to cover the whole interior surface of the large puerperal uterus, and in order to distribute its pressure over a large surface; it must have a long shank in order to reach the fundus, and the shank should be flexible, in order to permit the various curves which are needed to enable it to reach every portion of the uterine surface. The technique which I recommend is as follows:—

The operation should begin with a thorough intra-uterine douche of corrosive sublimate, about 1 to 3000. This may be given by any form of intra-uterine douche pipe, but I think that the danger of retention of the fluid is best avoided by the use of the instruments I show. The cervical speculum is that devised by Dr. W. L. Burrage, only modified by increasing its size to that which is suited to the parturient uterus. When it has been placed in position in the cervix, the tube is attached to a fountain, or Davidson syringe, is carefully emptied of air, and passed through the speculum to a point near the fundus of the uterus. The advantages of this tube are—first, that its size is so small in comparison with the speculum that a free return of the fluid is provided

for; and secondly, it is made of drawn brass, and can therefore be sterilized after each case by heating it red-hot in the flame, the only way in which a tube can be sterilized. When the uterus has been thoroughly douched the curettage may be performed through a Sims' speculum, or with the patient upon her back and without a speculum, as the operator prefers. The curette should be bent so that its cutting edge is directed towards the concave side of the curve, and the curve should be sufficiently sharp and long to permit the blade to reach the anterior wall of the given uterus at a point near the fundus. The instrument should then be introduced to the fundus, held lightly between two fingers and the thumb, and made to cover the whole anterior wall till every portion of its surface yields the firm, grating sensation to the touch, which is characteristic of uterine tissue. It should then be given the opposite curve, and made to cover the whole posterior wall in the same thorough manner. Next the curette should be so bent that its cutting edge will correspond to one lateral wall of the uterus; that wall should then be curetted, and while the instrument is thus curved, it should also be made to pass across the fundus. The same treatment should then be given to the other lateral wall. The intra-uterine douche should then be repeated, and the surface of the uterus should be covered with iodoform. This may be done by the use of iodoform bougies, but is, I think, much more thoroughly accomplished by packing the uterus with iodoform gauze through the cervical speculum, which is already in position, by the use of this fork. This completes the treatment.

My experience in the last five years warrants me in stating that when such treatment as this is adopted before the constitutional symptoms of sepsis are pronounced, its results should be uniformly good. In many of the cases the next temperature is normal, in the vast majority it is normal within forty-eight hours, and no subsequent symp-

toms appear. In a few cases the convalescence is more protracted, but out of the large number of cases which I have treated in this way I have never seen a fatal result in a case in which the treatment was instituted early. The first chart is fairly typical of a case treated at the onset of a virulent infection. When the stage of marked constitutional infection has been reached, the outlook is far less hopeful, yet even then a thorough curettage will sometimes lead to the recovery of apparently hopeless cases, if backed by active supportive treatment; and it is an absolute rule that no woman should be allowed to die from obstetric sepsis without a resort to this procedure.

DISCUSSION.

Dr. E. H. Stevens, of Cambridge: Unfortunately I came in late and heard only a small part of the paper. I am, however, somewhat familiar with Dr. Reynolds's views in regard to puerperal sepsis. I would like to say a few words with regard to this trouble, from the standpoint of the general practitioner. That puerperal sepsis occurs much less frequently at the present time than formerly I think every one will admit, but that it is very much more prevalent at the present time than is generally supposed I feel very certain. If we could get at all the facts, we should find a pretty large number of deaths occurring in this state each year from puerperal sepsis under one name or another, and that a very much larger number of patients are victims of this disease who are left with chronic invalidism; for this reason it seems to me a very important matter that this disease should be recognized and treated in the most intelligent way. That puerperal sepsis will occur under the most careful management, with all the precautions that can be taken, I believe is true, and I think this is important to bear in mind. I have often heard it said by gentlemen that a given case cannot be puerperal sepsis

because everything was done to prevent it, every known method was taken to make it as clean a case as possible. I think we do not want to make such a mistake. We want to recognize the fact that sepsis will occur in spite of all precautions taken to prevent it. And if this condition is recognized early it certainly is one of the most simple and easily curable of diseases. If not recognized early it is just as surely one of the most fatal diseases we are called upon to treat. Dr. Reynolds has undoubtedly pointed out to you the way to recognize this trouble, and also his belief as to the way to treat it. In the main I should agree with Dr. Reynolds in his method of treatment. In some of the minor details I should disagree with him somewhat. It seems to me that it should be made as simple as possible, so that it can be carried out by every practitioner. The simpler the method of treatment the more likely it is to be taken up by all of us and carried out successfully. I believe that in the great majority of cases, if the disease is recognized early it is not necessary to curette the uterus, that a careful wiping out through a large patulous os—which is almost always the condition found—with sterilized cotton, and if you like, cotton that has been moistened by wetting in a solution of bichloride of mercury will generally suffice, or after wiping out, the uterus may be washed out if you wish, although the washing out of a uterus I believe is somewhat dangerous, and my own opinion is that it is not necessary. In the majority of cases if done early, wiping out carefully and thoroughly, followed by draining with iodoform gauze, will be quite sufficient to relieve the trouble. Thorough, but loose packing of the whole uterine cavity insures perfect drainage, and it seems to me is one of the most important things in the treatment of this disease. Quite a large number of cases have come under my observation in the last few years where this line of treatment has been carried out and where the recovery has been rapid, the temperature falling at once and everything going on well,—I mean where this is carried out in the early period. If the disease has been going on for several days, as shown by the temperature, then you have something which is more serious and you have got to do an operation which is it seems to me a good deal more important. If you have four or five or six days of septic poisoning,

the germs have got deeper into the tissues, and curetting, I think, is desirable. To curette a uterus under these conditions is not altogether a simple thing to do if done thoroughly. It seems to me that men who have not been educated in the use of instruments of this kind had better call in some one who has had some special training in this work. I do not believe it is a thing to be done by every general practitioner.

I should like to speak of the very great importance of the use of the thermometer from the day the patient is confined to the tenth day. I believe that you will get your first warning of trouble by the rise of temperature. Many a case of fatal sepsis goes on without a chill, the temperature being the only warning you have, or one of the first warnings. I have even seen fatal cases without a chill; so that the use of the thermometer twice a day is all important; as soon as the temperature begins to go up it is time to look about and see what can be found to account for it, and I think it is well to bear in mind that the most likely thing to occur to the puerperal woman to produce fever is sepsis, and if a satisfactory explanation cannot be found it seems to me we are warranted in at once going to the fountain-head, and cleaning out the uterus carefully; cleaning out the vagina also and packing as I have said. It never does any harm if it is done occasionally when not needed, and it will generally do a great deal of good.

I think a careful consideration of Dr. Reynolds's paper will lead us to the following conclusions: 1. That the use of the thermometer is of the first importance. 2. That as soon as we get symptoms of fever we must find out the cause of it and act promptly and not feel that we can wash out the vagina with a douche, or wash out the uterus with a Jennison tube or something of that kind and get rid of the trouble. That will not wash away the broken down septic material, and I do not believe it is safe to temporize in that way.

Dr. W. S. Brown, of Stoneham: I think we are indebted to Dr. Reynolds for a very valuable paper, but there are two points I should like to state in which I differ from him. One is in the use of corrosive sublimate. I think the time has come when we ought to give up the use of

corrosive sublimate entirely except for outward applications. The reason for this is, the strong solutions of corrosive sublimate are really less likely to be injurious than the weak ones. The weak ones we are told to use, and they are dangerous because more quickly absorbed, and we have cases of dysentery constantly following the use of weak solutions of corrosive sublimate. The instruments the doctor showed us are excellent in the hands of an expert, but it is not to be expected that the ordinary country doctor can afford to keep such a supply of instruments for every particular case, but he can at all events own a curette. The point I should like to make is this, that it ought to be a dull curette instead of a sharp one. About three weeks ago I was called to a case in my immediate neighborhood in the hands of a young physician, a very talented young man, where the temperature was 106° five or six days after a miscarriage. He had nothing but a dull curette. I curetted the uterus and the temperature next morning fell to 101°, and the next day to normal. Now I think it is a great deal safer to use a dull curette. I use the sharp one myself occasionally, but if the case does not require it I think it is under ordinary circumstances safer to use the dull one.

In regard to a substitute for corrosive sublimate, I think the permanganate of potash is far superior in several respects. It is a perfectly safe solution to use. There is nothing poisonous about it, and you can tell by the color of the outflow whether you have thoroughly cleaned the parts or not. When it comes out as beautiful a red as you inserted, then you are sure that the parts are clean.

Dr. ———: The subject of constipation has been alluded to. It strikes me that that is rather a strange thing to occasion a rise of temperature of several degrees in the lying-in woman. In our practice we frequently come across cases of constipation that have existed in some cases for two weeks and with no appreciable elevation of temperature. There is another point I wish had been touched upon, and that is the subject of constitutional treatment in these cases. No allusion whatever was made to that. I think that perhaps many times the giving of good constitutional remedies would aid matters very materially.

Dr. C. M. Green, of Boston: I have not had the opportunity of hearing Dr. Reynolds's paper; but I should like to say a word on the subject of prevention. We try to teach medical students that they must regard obstetrics as surgery. It seems to me that covers the entire ground. If a man realizes, when he is about to use his hands or instruments in the conduct of a case of labor, be it even a normal case, that whatever is to touch the patient about the genitals should be made surgically clean, the same as though a surgical operation were to be performed, he should have no septicæmia. The great difficulty has been that it has been hard to impress upon the community that the doctor's hands should be washed *before* he makes the examination. You will remember the teaching not so many years ago, when a distinguished professor told his students that after making the vaginal examination they should wash their hands. Now we say: wash the hands first. What they do after the examination we don't care. If the conduct of the case is regarded as a piece of surgery, and men truly believe that puerperal septicæmia is not an autogenetic affair, but heterogenetic, that the germs must be introduced from without, we shall not have septicæmia in Massachusetts or elsewhere. I know I may stir up adverse criticism when I say that practically there is no such thing as autogenetic septicæmia. I am not prepared to demonstrate that statement scientifically: but, as I have said elsewhere, I think it is much the safest way to take that ground. I am willing to grant that there are occasional cases of septicæmia originating perhaps from the rupture of a pus-tube during labor; but those cases must be very rare. Certain it is that the very great majority of cases of puerperal sepsis are caused by the introduction of the germ from without. That being the case, let the obstetrician make his hands as absolutely sterile as it is possible to do; let him have his instruments, dressings, etc., sterile, and he will not have septicæmia.

As regards the detection of septic infection and its early treatment, it is a matter of the greatest importance for successful treatment of sepsis that it should be recognized very early. That can be done almost always if the practitioner conscientiously observes his temperature chart in conjunction with other symptoms; but even in the absence of other

symptoms, a threatening or warning of sepsis can almost invariably be detected by the study of the chart. As I had occasion to say at another meeting, the great difficulty has been, as I have seen it, that physicians do not keep these charts. I am aware of the fact that many patients are unable to employ a trained nurse, that the physician is handicapped to the extent that no one is in attendance competent to take the temperature; and the only temperatures taken are taken by the physician. I am aware also that many cases pay small fees, and that physicians make few visits; and perhaps on some days the temperature is not taken at all. Defective charts are valueless for purposes of diagnosis. To be of any value the temperature should be taken at regular hours, morning and evening, every day. I have advised young men in their early practice, in cases where they have no trained nurses, to make a morning visit at a regular hour, and to leave a self-registering thermometer, with instruction to put it under the patient's tongue at a certain hour in the afternoon; in this way a satisfactory chart can be constructed. To a man who has watched cases of beginning sepsis, it is very easy almost always to read the lesson in that chart in the first few days; and with the slightest warning a careful examination should be made. When I have thought from the chart that there was sepsis, on making the examination I have been very rarely disappointed in not finding it.

One other word in the nature of a criticism; if the temperature of the patient goes up to 102°, many men will begin to give doses of antipyretics. These probably will succeed in bringing the temperature down; but the sepsis is there all the same. That has not been cured, the seat of invasion has not been treated, and the false lowering of the temperature serves only to mislead the medical attendant, to lull him into a sense of security that the woman is getting better. Valuable time is in that way lost. If he will simply watch the chart until he sees reason to fear sepsis, and then make a careful local examination to seek for the point of entrance and treat it locally, he will see the temperature fall and the woman get well without resort to antipyretics. The use of alcohol in the same way I deprecate at the early stage of the septic process.

Another practice still in vogue to a large extent is this: when the temperature goes up and the lochial discharge gets foul, men will order vaginal douches. I believe it is the worst thing one can do. I grant that the use of almost any disinfectant in the vagina will kill a bad odor, but that does not cure the disease. Further than that, the seat of invasion is in most cases, certainly in a very large number of cases, outside of the uterus, that is to say either in the vagina, somewhere on the torn perineum, or on the torn cervix very likely. Now if there is a septic process going on in the vagina and the vaginal douche is used, there is great risk of washing up septic material into a previously healthy uterus, and we have a worse state of affairs than before; consequently I would give no vaginal douche whatever, after the douche at the conclusion of labor, but, on a reasonable suspicion of infection, would make the examination which I have no doubt has been described, carefully find the source of invasion, treat that locally and give no more vaginal douches.

When we come to the treatment of a later case, where the infection has gone on to the point of septicæmia, local treatment is still of value, but general treatment then becomes necessary. Then we have the patient in the condition of a person bitten by a rattle-snake. The poison is in the patient's blood. She has a general disease. That is to be combated by general measures,—alcohol in large doses, quinine, etc. I would like to make these points: first, that we look upon obstetrics as surgery, and make our hands and instruments as surgically clean as if about to open the abdomen or do any surgical operation; second, that we avoid the use of antipyretics in the early rises of temperature, and devote our attention to the local condition rather than employ artificial means to reduce the temperature; and third, that we do not employ douches simply because the discharge is foul, because the patient may thereby be made worse than if simply left alone.

Dr. Elisha Chenery, of Boston: The gentleman spoke of his doubts of constipation producing febrile symptoms. I was in the same condition some months ago; I could hardly conceive such a thing. I attended a woman in confinement; the labor fairly normal, and when we were looking

for her to do well she began to develop fever, had chills, headache, and I was in great anxiety as to septicæmia. I had used every precaution I could. It occured to me that her condition might be owing to constipation. She had had an injection and had taken mild carthartics, but without satisfactory results. I finally resorted to more active catharsis, cleared out the bowels thoroughly, with a disappearance of the febrile symptoms. It was evidently a febrile condition produced by the condition of the bowels and not by the condition of the uterus. A case came to mind while the paper was being read about which I am in doubt. My preceptor had a daughter who married one of my fellow students. She was confined, and after the confinement she grew weak, pale, and produced an immense amount of milk. Consultations were held. It was feared that she was exhausting herself by lactation. An effort was made to stop the flow of milk with success. Diarrhœa, however, came on and she was in great danger from that. The movements were lessened after much effort, and then the force of the system seemed to fail and the woman died of exhaustion. Now was this a case of septicæmia, or one of those freaks of the nervous system swinging out of its ordinary lines so to speak?

A friend of mine attended his own wife, using all possible precautions against septicæmia. A few weeks after the confinement she was weak, had chills, fever. A consultation was held and the consulting doctor thought she must have malaria. It was in the country in the dead of winter, and a region where malarial fever was unknown. Another physician was called, who thought it must be septicæmia. I saw the case about four weeks from the confinement and she was having an excessive flow of milk. I suggested to stop the flow of milk. But the temperature remained high; there were sweats and chills. The woman grew weaker, paler, and at the end of six weeks from confinement died. Was that a case of septicæmia?

Dr. ———: Prophylaxis is a very good thing, and I would simply say that I recall two cases in which the cultures given to me came from patients who had died of puerperal septicæmia. I found they contained the colon bacillus. It would, therefore, seem to me important to protect the anus at the time of labor.

Dr. Reynolds: Dr. Stevens speaks of wiping out the uterus with gauze in mild cases. I purposely omitted any reference to the procedure of wiping out the uterus rather than curetting it, because I hoped Dr. Stevens would speak of that himself. I believe that is a great deal better method than the use of intra-uterine douches. I believe that if the practitioner feels himself incompetent to use the curette, and unable to obtain the assistance of some one who is able to use it, he cannot do better than wipe out the uterine cavity carefully and thoroughly with gauze; but I believe it to be a very much less efficient method of treatment than the use of the curette. I believe that in fairly competent hands the use of the curette is safe enough to be advised even in mild cases, rather than wiping out the uterus.

In direct answer to Dr. Brown's criticism of a sharp curette, I would say that I began with a dull wire curette, and used it for some years, because I was afraid of the sharp curette. I kept getting new curettes made, and each one made a little sharper, and I kept getting, as I thought, a little better results. I now think that if a sharp curette is made large enough, it is about as little likely to perforate the uterus as the small dull curette which is ordinarily used. The distribution of the pressure over a wide area makes the sharp curette safe. I do not believe that a man who is incompetent to use the sharp curette better ever use any curette at all. I think the fact that some twenty-five gentlemen who have been house physicians at the Lying-in Hospital have curetted cases without any accident, is a pretty good argument against the great dangers of the sharp curette in inexperienced hands, though I think it an operation which ought to be conducted with care. Finally, I think that if the practitioner is not capable of applying what he believes to be the best treatment, he had better get somebody else to do it.

As regards the criticism of my use of corrosive sublimate. I do not see any reason why we should not use permanganate of potash, but if corrosive sublimate is followed by boiled water, or carbolic solution, or anything harmless, to wash out the corrosive, there will not be any trouble follow, at least I have never seen any. I do not think that this is a very important matter.

One gentleman raised two points on which I am sorry I did not make myself clear. In the first place about constipation. I think constipation will make more temperature during the puerperium than at any other time, yet I do not think it is sufficient ground for any excessive or prolonged elevation of temperature, unless in the most extreme cases; but there are many of the profession who think that it is, and I hope that that opinion will grow less prevalent.

As regards constitutional treatment. I did not have time to go into that at length. I mentioned it as an absolute necessity when constitutional symptoms are once present. I believe that even then there is but little hope for the patient unless the source of the poisoning is eliminated from the system by local treatment. When that has been done constitutional treatment is of the utmost importance, it is the only means of treatment left.

As regards the reference to the bacillus coli communis, and the necessity for looking out for the anus, I do not think that in practice the infection is apt to come from accidental contamination of the vagina from the rectum in any but one way. I think that when the perineum is lacerated, and the finger is inserted into the rectum to sew it up, there is danger of carrying infection into the vagina, unless the finger is kept in the rectum until the last suture is tied.

ARTICLE XIII.

VACCINATION.

THE PROTECTIVE POWER OF VACCINATION.

By JOHN H. McCOLLOM, M.D.
OF BOSTON.

THE TECHNIQUE OF VACCINATION.

By WILLIAM N. SWIFT, M.D.
OF NEW BEDFORD.

RADICAL DIFFERENCES IN METHODS OF CULTIVATION OF VACCINE LYMPH.

By SAMUEL W. ABBOTT, M.D.
OF WAKEFIELD.

READ JUNE 12, 1894.

THE PROTECTIVE POWER OF VACCINATION.

BY JOHN H. McCOLLOM M.D., BOSTON.

When, in the latter part of the last century, Jenner's attention was called to the fact that milkmaids and others, who had the care of cows, although exposed to small-pox had extremely mild attacks of the disease, England was passing through one of the most frightful epidemics of variola that the country has ever experienced. So dire was the havoc, so great was the distress caused by this disease in the middle and latter part of the last century, that anything that would have mitigated its severity would have been hailed as one of the greatest boons to mankind. In the present century epidemics of small-pox have been comparatively rare, and their ravages can in no way be compared to those of the epidemics of the last century.

The 14th day of May, 1796, a day memorable in the annals of medical science, is the natal day of vaccination, for it was on this day that vaccine lymph was taken from the hand of Sarah Holmes, a milkmaid, who had been infected from one of her master's cows, and inserted in the arm of James Phipps, a healthy boy eight years of age. He went through the vaccine disease in a regular manner. On the 1st of July following, the crucial test of the protective power of vaccination was made. The boy, who had been vaccinated in May, was inoculated with matter taken immediately from a small-pox pustule. He did not contract variola.

On December 8, 1802, the Board of Health of Boston published a report of the investigations of eleven of the most distinguished physicians of that time on the protective power of vaccination. The report commences with the following paragraph:

"The Board of Health for the Town of *Boston*, are happy to have it in their power, this day, to announce to their fellow-citizens the result of one of the most complete experiments which perhaps has ever been made, to prove the efficacy of the *Cow-pox*, as a preventive against the *Small-pox;* and while they take the liberty to congratulate the public on this important discovery, they do earnestly recommend its introduction generally, and are confident that it will be the means of preserving the lives and adding to the happiness of millions."

The report then gives in detail the arrangements that were made to prevent any mistake in the conduct of the experiments, the relation of which need not detain us. The most important part, however, is the report of the physicians themselves, and this is so manifestly important that it will be quoted in full.

The Physicians' Report.

"With a view of ascertaining the efficacy of the Cow-pox in preventing the Small-pox, and diffusing through this country the knowledge of such facts as might be established by a course of experiments instituted for the purpose, and thereby removing any prejudices, which might possess the public mind on the subject, the Board of Health of the town of *Boston*, in the course of the last Summer, came to a determination to invite a number of Physicians to cooperate with them on this important design; and with a liberality becoming enlightened citizens, erected a Hospital on *Noddle's Island*, for carrying it into execution.—Accordingly, on the 16th day of August last, nineteen boys, whose names are subjoined, were inoculated for the Cow-pox at the office, and in presence of the above mentioned Board, with fresh, transparent Cow-pox matter,

taken from the arms of a number of patients then under this disease. These all received and passed through the disease to the complete satisfaction of every one present, conversant with the disease.

On the 9th of November, twelve of the above children, together with one other, GEORGE BARTLETT by name, who had passed through the Cow-pox two years before, were inoculated for the Small-pox on *Noddle's Island,* with matter taken from a Small-pox patient in the most infectious stage of that disease. The arms of these lads became inflamed at the incisions, in proportion to the various irritability of their habits, but not to a degree greater than what any other foreign, virulent matter would have produced. The Small-pox matter excited no general indisposition whatever, through the whole progress of the experiments, though the children took no medicines, but were indulged in their usual modes of living and exercise; and were all lodged promiscuously in one room.

At the same time and place, in order to prove the activity of the Small-pox matter, which had been used, two lads, who had never had either the Small-pox or Cow-pox, were inoculated from the same matter. At the usual time, the arms of these two patients exhibited the true appearance of the Small-pox. A severe eruptive fever ensued, aud produced a plenteous crop of Small-pox pustules, amounting by estimation, to more than five-hundred in one, and two hundred in the other.

When these pustules were at the highest state of infection, the thirteen children before mentioned, were inoculated a second time, with recent matter, taken from the pustules, which said matter was likewise inserted into the arms of the seven other children, who were absent at the first inoculation. They were all exposed, most of them for twenty days, to infection, by being in the same room with the two boys, who had the Small-pox, so that, if susceptible of this disease, they must inevitably have received it, if not by inoculation, in the natural way.

Each of the children was examined by the Subscribers, who were individually convinced from the inspection of their arms, their perfect state of health, and exemption from every kind of eruption on their bodies, that the Cow-pox prevented their taking the Small-pox, and they do therefore consider the result of the experiment as satis-

factory evidence, that the *Cow-pox is a complete security against the Small-pox.*

JAMES LLOYD.
SAMUEL DANFORTH.
ISAAC RAND.
JOHN JEFFRIES.
JOHN WARREN.
THOMAS WELSH.
BENJAMIN WATERHOUSE.
JOSIAH BARTLETT.
JOHN FLEET, JUN.
JOHN C. HOWARD.
THOMAS DANFORTH."

It must be borne in mind that the men who signed this report had abundant opportunity for observing small-pox, and therefore their testimony regarding the condition of these children after vaccination and after inoculation is of the greatest value.

Having shown that small-pox virus inserted in the arms of vaccinated persons is inert, it may be well to take a glance at mortuary statistics before and after the introduction of vaccination. In Boston, from 1721 to 1792, a period of seventy-one years, there were three very severe and fatal epidemics of small-pox, or one about every twenty-three years. Since 1792 to the present time, a period of over one-hundred years, there has been no serious epidemic of this disease in Boston. The outbreak of small-pox in 1872–73, in this city, bears no comparison in severity to the epidemics of the last century. In this slight epidemic of twenty-one years ago, the ratio of deaths to the thousand of the living was 2.9 in 1872 and in 1873, 1.2, while in the epidemics of the last century from one third to one fourth of the population succumbed to the disease; or, to put it another way, if the disease had been as prevalent

and fatal in 1872–73 as it was in any of the severe epidemics of the last century, the number of deaths would have amounted to 64,300 instead of to 1,040. The investigations of a committee of the Epidemiological Society of London showed conclusively that in England out of every 1000 deaths in the half century from 1750 to 1800, there were 96 deaths from small-pox, while that out of every 1000 deaths from 1800 to 1850 inclusive there were only 35 from this cause; a diminution of nearly two thirds. In the German states it has been shown that out of every 1000 deaths before vaccination was employed, 66.5 were caused by small-pox; but that after vaccination came into use there were only 7.26. The report from the British army is very conclusive in favor of the protective power of vaccination, because the regulation regarding vaccination is very strict. Every man is vaccinated at the time of his enlistment. During the Franco-Prussian war, when the French and Prussian armies would alternately occupy the same villages and hamlets, it was found that the French soldiers, who were not carefully vaccinated, suffered from epidemics of small-pox of greater or less severity, while the Prussians, who were very carefully vaccinated, were almost entirely exempt from the disease. In the Prussian army from 1876–1885 inclusive, with an average strength of 300,000 men, there was only one death from small-pox; while in the French army for the same time, with an equal number of men, there was an average of 54 deaths from this disease each year.

The operation of compulsory vaccination was suspended in Zurich, Switzerland, in obedience to popular clamor in 1883. The deaths from small-pox, per 1000 deaths from all causes for the two previous years and that year had been in 1881, 7; in 1882, 0; in 1883, 8. They rose after compulsion had ceased to be used to 11.45 in 1884; to 52 in 1885; and in 1886 to 85 per 1000.

The history of the last small-pox epidemic in Montreal illustrates the beneficial effects of vaccination. As is well known, the French residents suffered much more severely than the English, because the latter were comparatively well vaccinated. It was not until the most stringent rules regarding vaccination were adopted that there was any marked abatement in the severity of the epidemic.

The public health records of Sweden show that the average number of deaths in each year from small-pox for one million of the living was from 1774 to 1801, before the introduction of vaccination, 1,973; while during the period of optional vaccination, from 1802 to 1816, the number fell to 479. The most marked diminution was reached however during the period of obligatory vaccination, 1817 to 1877, when the average number was only 189 per 1,000,000.

The difference in the number of deaths from small-pox in countries where vaccination is optional, as compared with those where it is compulsory, is very marked. For instance, in Austria-Hungary, in Russia and in France, where vaccination is optional, the death-rate from small-pox per one million of the inhabitants was in 1887—583.7; 535.9: 167.0; and in 1888—540.3; 231.5; 191.9; respectively. In the German Empire, where vaccination is compulsory, the rate per one million for these two years was in 1887, 1, and in 1888, .8. In Denmark, in Norway and Sweden, where the laws regarding vaccination are very stringent, the death-rate for the corresponding years per 1,000,000, was 0.

It may be of interest to compare the percentage of deaths in the unvaccinated with those of the vaccinated in some of the English Small-pox Hospitals. In the London small-pox hospital, from 1870 to 1872, of 14,808 cases treated the percentage of deaths in the unvaccinated was 44.8, while of those alleged to have been vaccinated, with or

without the evidence of a scar, the percentage was 10.1. In the same hospital from, 1876 to 1880, the percentage of deaths in the unvaccinated was 44.4; in the vaccinated, 8.8. In the Homerton Hospital, from February 1871 to December 31, 1877, during which time 5,479 patients were treated, the percentage of deaths in the unvaccinated was slightly greater than in the London hospital, being 46.1; in the vaccinated there was a corresponding slight increase, the rate being 11.5 per cent. In the Deptford Hospital, in 1881, the percentage of deaths in the unvaccinated was 47.4; in the vaccinated and in those alleged to have been vaccinated, 11.3. In the Fullam Hospital the proportion of deaths of the unvaccinated was 44.2; of the vaccinated, 10.1. In the Dublin Hospital 64.2 per cent. of the unvaccinated died; of the vaccinated, 12.0 per cent. The total number of patients treated in these hospitals was 48,594; the average death-rate of the unvaccinated was 46.9 per cent; of the vaccinated and those alleged to have been vaccinated, 10.35 per cent. The criticism cannot be made with truth that these statistics err on the side of the vaccinated, for as a matter of fact they are in favor of the unvaccinated. If only the individuals who had two perfectly characteristic scars of vaccination had been classed among the vaccinated, the percentage of deaths would have been much lower than appears from the figures just mentioned.

In the report of an epidemic of small-pox that occurred in Sheffield, England, in 1887 and 1888, it was found that of 4,493 vaccinated children under ten years of age exposed to the disease, 7.8 per cent. contracted it, and that only one tenth of one per cent. died; that of 13,435 vaccinated persons of ten years of age and upwards, 28.1 per cent. contracted the disease and 1.4 per cent. died; that of 18,020 vaccinated persons of all ages, exposed to the disease, 23 per cent. contracted it, and the death-rate was

1.1 per cent. On the other hand, of 263 unvaccinated children under ten years of age, 86.9 per cent. had the disease and 38.1 per cent. died; of 469 unvaccinated persons, ten years of age and upwards, 68.6 per cent. had the disease and 37.1 per cent. died; of 736 unvaccinated persons of all ages, 75 per cent. contracted the disease and 37.2 per cent. died. It would seem that these figures ought to convince any one of the protective power of vaccination. Certainly a death-rate of one tenth of one per cent. in the vaccinated as compared with a death-rate of 38.1 per cent. in the unvaccinated is a most conclusive argument in favor of vaccination.

The statistics of the epidemic in Sheffield also prove the importance of re-vaccination, which is just as necessary as primary vaccination. In every epidemic of variola the small number of the vaccinated who have died have been found, not among those who had recently been vaccinated, but among those who had been vaccinated fifteen to twenty years previous to the outbreak of the disease. This was found to be the case, in a marked degree, in the epidemic of 1872–73 in Boston. If we look at these Sheffield statistics again we find that the percentage of cases in the vaccinated under ten years of age was 7.8; that the deaths were .1 of one per cent.; while of the vaccinated of ten years of age and upwards the percentage of cases increases to 28.1, and that of the deaths to 1.4. In the class of the vaccinated of all ages, when those under ten years of age become a factor, the cases diminish to 23 per cent. and the deaths to 1.1 per cent. There is no such marked difference in the percentage of deaths among the unvaccinated, although there is a marked increase in the percentage of cases in those under ten years of age as compared with those of ten years and upwards; showing that unvaccinated children are particularly susceptible to the disease. The report of the Registrar-General of Eng-

land for 1880 shows conclusively that during the period of optional vaccination in that country, from 1847 to 1853, the number of deaths from small-pox in children under five years of age, per 1,000,000 of the inhabitants, was 1,617; while in persons 45 years of age and upwards the number was only 22. In the period of obligatory vaccination, from 1872 to 1880, the number of children under five years of age, per 1,000,000 of the living, who died of the disease, was 323, as compared with 58 in persons of 45 years of age and upwards; showing a marked diminution in the number of deaths in children under five years of age, and a marked increase in the deaths of those of 45 years of age and upwards. These figures embrace both vaccinated and unvaccinated who died of the disease.

It has been claimed that the decline in small-pox mortality is due not to vaccination, but to improved sanitary conditions. If this were true, however, the diminution in other infectious diseases should be as marked as in that of small-pox, which is not the case. While the small-pox death-rate, in England, since the introduction of vaccination, has fallen 80 per cent., in children under five years, that of other diseases has fallen only 6 per cent., and while the small-pox rate has increased in a marked degree in persons over forty-five years of age, that of other diseases has fallen 3 per cent.; or to look at it in another way, while the death-rate from other causes than small-pox, in persons of all ages, has fallen 7 per cent., the death-rate from small-pox has fallen 49 per cent. This marked diminution in the death-rate from small-pox can only be explained by the protective power of vaccination.

In Boston since April, 1881, there have been 217 cases of small-pox. Each patient has been carefully examined in regard to vaccination, and although some of these patents claimed to have been vaccinated, yet, if a satisfactory scar was not found, the patient was classed among the un-

vaccinated. Of these 217 patients, 121 had been vaccinated, and they all recovered. Of the remaining 96 who did not show any evidence of vaccination, 46 recovered and 50 died, or about 50 per cent. Four of the patients who died stated that they had been vaccinated some twenty-five to thirty years previous to their illness, but as there was no evidence of the fact, as has been before stated, these patients were classed with the unvaccinated. If, however, they had been classed with the vaccinated, the death-rate would still overwhelmingly prove the protective power of vaccination, being 3.2 per cent. in the vaccinated as compared with 50 per cent. in the unvaccinated.

The influence of a successful vaccination on the course of the eruption of small-pox is very marked. In a case of unmodified small-pox, no matter how mild the attack, the eruption always passes through the regular stages of papule vesicle and pustule; while in a vaccinated person part of the eruption aborts, that is to say the papules never become vesicles. If vaccination did nothing more than simply abort the eruption it still would be of inestimable value. When, however, we see vaccinated infants nursing mothers who have small-pox, without the children showing the slightest indication of disease; when we see vaccinated mothers nuring infants ill of the disease, without contracting it, it would seem that any sane man could have no doubt of the protective power of vaccination. The degree of infectiousness of small-pox in the unvaccinated is not fully appreciated. Small-pox is one of the most infectious diseases among the unvaccinated. For instance, during the last winter, in a house containing twenty-five people, exposed to an unrecognized case of small-pox, 16 of whom were unvaccinated, 14 contracted the disease and five of them died. All of the vaccinated escaped except one man who had been vaccinated 45 years ago, and he had an extremely mild attack of the disease.

The whole matter of the protective power of vaccination can be summed up in no better way than by quoting the words of Dr. Russell, health officer of Glasgow, who says:

"After closely observing over 1,000 cases of small-pox in hospital, I have become deeply impressed with the helplessness of medicine when face to face with the unmodified disease. In this sense, the only successful mode of treating small-pox is by vaccination. To take firm hold of its efficacy and necessity, and enforce their convictions in practice without wavering, is the most useful, almost the only useful action the medical profession can adopt against variola. When a case presents itself, the first question in prognosis is regarding vaccination, although then the chief work of vaccination has been done, inasmuch as the only other circumstance in the patient's condition which is worth mentioning as affecting the prospects of recovery is the extent of the eruption, which I shall show is the direction in which post-vaccinal small-pox is chiefly modified. If *vaccinated*, then the attitude is one of hope that the disease may be cut short, however bad present appearances are, though, in fact, the probability is that the symptoms are from the first trivial. If *unvaccinated*, then the attack will probably be severe, the eruption copious or confluent, and we recognize a virulence and deep constitutional disturbance against which the resources of medicine are powerless. As regards the individual, the opportunity for medical interference is past, and we can only turn his case to profit by following on those about him the practice from the neglect of which he suffers."

Having proved by statistics from the most reliable sources the great protective power of vaccination, it may be of interest to inquire into the possible dangers and discomforts that may attend or follow the operation. Since the introduction of the use of animal lymph, the danger of inoculating syphilis has been entirely removed. The chance, however, of communicating syphilis by vaccination in the days when humanized lymph was used, almost exclusively, was very slight. There is no well-authenticated and relia-

ble report of such an occurrence in this locality. The existence of many of the cases reported elsewhere, from careless and inaccurate statements regarding them, must be a matter of doubt to the careful, intelligent and unabiased observer. It has been too much the custom in the report of these cases to completely ignore the possible and probable existence of hereditary or acquired syphilis. If in a given case syphilis appears after vaccination, there should be the most careful and searching investigation in regard to hereditary or acquired disease; but this has not been the case in many instances. It is too much the custom of the laity and, I regret to say it, of some members of the profession, to apply the *post hoc ergo propter hoc* theory to explain the transmission not only of syphilis but of many other diseases by vaccination. Some few years ago a child, who had a slight eruption the nature of which was not evident at the time of the visit, was brought to me for vaccination. On account of this eruption the child was not vaccinated. When he was seen six weeks later he had a perfectly characteristic syphilitic eruption. If this child had been vaccinated no amount of argument would have convinced his parents that the disease was not caused by vaccination. A false keloid tumor may appear at the site of the vaccination, but this has nothing to do with the quality of the lymph used, but is due to some peculiarity of the individual constitution. These false keloids do not cause any pain nor discomfort, but are simply a source of annoyance from their unsightly appearance. These tumors are extremely rare and occur only about once in ten thousand vaccinations. Urticaria is an annoying complication of vaccination, but it is not in the slightest degree a cause for apprehension, and can in no way be attributed to the lymph used. The appearance of this eruption, therefore, cannot with justice be used as an argument against vaccination. The cases of vaccinal urticaria always recover in a short

time. They are however a source of annoyance to the practitioner and are one of the most fertile sources of argument of the anti-vaccinationist; simply because the anti-vaccinationist is too ignorant of the whole subject of disease to appreciate the relative importance or non-importance of any cutaneous manifestations occurring after vaccination. Six years ago I vaccinated a healthy boy three months old with fresh calf lymph. The vaccine disease went through its regular stages without any undue amount of constitutional disturbance. The vesicles were not specially large. On the eighth day after vaccination the mother of the child, who had never been vaccinated, was vaccinated from her child's arm. She had a perfectly characteristic vesicle, and she also had a very extensive eruption of urticaria. In this case the lymph itself, certainly, was not the cause of the attack of urticaria.

Eczema may possibly be aggravated to a slight extent by vaccination, and when there is no history of any special exposure it is well to postpone vaccination until the eczematous eruption has been relieved by treatment; but after a known exposure or during an epidemic of small-pox there should not be the least hesitation in vaccinating a person suffering from eczema. Dr. Lawson Tait reports in the *British Medical Journal* of 1871 two cases of eczema apparently cured by vaccination. These two cases are not sufficient to prove anything in favor of the curative power of vaccination on eczema, yet they are sufficient to show that vaccination does not always have a distinct injurious effect on this skin disease.

If a child when vaccinated is poorly nourished, and if there is no care taken of the arm, sometimes, by rubbing and scratching after the vaccine vesicle has arrived at maturity, and the retrograde process has commenced, pus organisms may be conveyed from the vaccinated arm to other parts of the body, causing an eruption of impetigo. Im-

petigo, however, is not a serious disease, and is very easily relieved by proper treatment. The eruption of impetigo has a very slight resemblance to that of small-pox, and this slight similarity has caused ignorant opponents of vaccination to assume that small-pox is caused by vaccination. This argument against vaccination is too absurd to need confutation.

Cellulitis of a somewhat severe type sometimes follows vaccination, but in nearly every instance the attack is due to injury of the vaccine vesicle after it has arrived at maturity. The almost total lack of care of a vaccinated arm is one of the most productive sources of this complication. With proper care on the part of the individual vaccinated this trouble can almost always be avoided. The glands in the axilla do sometimes suppurate, it is true, and give rise to considerable pain, but this occurrence is so rare and is so manifestly due to the individual constitution, that it cannot with justice be used to the detriment of vaccination.

Regarding the transmission of tuberculosis by vaccination, there is no proof that this occurrence has ever taken place. Blenheim, it is true, in the *Centralblatt für Bakteriologie* for May 1st, 1874, reports a series of experiments in which he states that rabbits inoculated with vaccine lymph from a tuberculous cow, died trom tuberculosis, but the number of rabbits used in this experiment is too small, and the period of incubation too short to prove anything. Blenheim, however, makes the wise and pertinent suggestion that all animals before they are used for the propagation of vaccine lymph should be tested with tuberculin. In France there is a regulation requiring that an autopsy be made on each vaccinated animal before the lymph from it is distributed.

When the specific organism of the vaccine disease is discovered, as some day it surely will be, and that before long,

every specious argument against vaccination will be swept away. If the lamented Dr. Stephen C. Martin had not been removed by an untimely death, it is not too much to say that probably pure cultures of the specific organism of vaccinia would now be in use. The advantage of a pure culture of this specific organism is obvious, for instead of propagating the lymph from animal to animal the cultures could be made in a laboratory where every safeguard against contamination could be adopted.

Much has been said regarding deaths due directly or indirectly to vaccination, but the most careful search of the records of deaths, in this city, for the past twenty years, fails to show a single instance. The few cases in which vaccination has been alleged to be the cause of death have been, upon investigation, found to be due to some other cause, dependent in no way either directly or indirectly on vaccination. One case in which a child was vaccinated and died two weeks afterwards from pneumonia, as proved by the autopsy, is a fair sample of the alleged deaths from vaccination. In another instance a child died from scarlet fever four weeks after being vaccinated, but as the arm was nearly well at the time, the death of the child could not be attributed to the effect of vaccination. Some few years ago a man about thirty years of age died, five or six weeks after he was vaccinated. There had not been the slightest irritation at the site of the scarification, although it was alleged that he died from the effects of vaccination. The autopsy proved that the man's death was caused by a complication of diseases due in no way to vaccination.

Since April 30, 1873, in this city there have been vaccinated at the public stations nearly 200,000 people, and although there have been some sore arms and a considerable amount of vaccinal urticaria, still there has been no instance of any serious trouble, causing the loss of either life or limb. Careful inquiries at the various hospitals show, that

while a certain number of persons have applied for treatment for cutaneous manifestations following vaccination, and for sore arms, there has been no case where there has been any serious trouble.

If the dangers of vaccination were fifty-fold; if its protective power was only one tenth of what it really is, no man, who has had any experience in the treatment of small-pox, could have any doubt of the value of vaccination to the community. No man who has been brought in daily contact with a person suffering from unmodified small-pox, one of the most repulsive diseases in existence; no man who can intelligently and with an unbiased mind study mortuary statistics, can have any doubt of the protective power of vaccination. This whole subject can be summed up in a few words by the quotation from Scripture placed on Jenner's tomb:

"And he stood between the dead and the living; and the plague was stayed."

In no better way can this paper be brought to a close than by quoting Jenner's epitaph, which very concisely embraces the whole subject:

"Within this tomb hath found a resting-place
The great physician of the human race,—
Immortal Jenner!—whose gigantic mind
Brought life and health to more than half mankind.
Let rescued infancy his worth proclaim,
And lisp out blessings on his honored name;
And radiant beauty drop one grateful tear,
For beauty's truest friend lies buried here."

THE TECHNIQUE OF VACCINATION.

BY WILLIAM N. SWIFT, M.D., NEW BEDFORD.

I HAVE collected a few statistics in regard to the manner of performing the operation of vaccination in different localities.

I have answers to a list of questions on this subject from the health officers of ninety-nine of the largest cities in the United States and Canada.

Question 1. Have you any prescribed rules in regard to the manner of performing the operation of vaccination?

I find twelve cities have such rules, while eighty-seven have no prescribed regulations and the matter is left to the physicians who are detailed for this work.

Question 2. Is it the custom of vaccinators in your city to wash the skin before vaccinating?

In thirty-nine cities it is the custom to wash the skin; in sixty cities this is not done.

Question 3. Are any other antiseptic precautions used?

There were eighty-eight negative and eleven affirmative answers to the question, and in only four cities is it the custom to use any antiseptic solution. The other seven affirmative answers referred to the cleaning of instruments.

Question 4. At how many points is the virus inserted?

In fifty-one cities it is the custom to vaccinate at one point; in twenty-six cities at two points; in eleven cities at one or two points; in three cities at three points; in one

at four points; in one at five points; in one at one to four points; in one at two to five points, and in two the answer was variable.

The cities where it is the custom to vaccinate at one point include Chicago, New York, San Francisco, Philadelphia, Washington, New Orleans, Brooklyn, Detroit, New Haven, Portland, Me., Richmond, Va., Lowell and Lynn, Mass.

It is the custom to vaccinate at two points in Quebec, St. Louis, Milwaukee, Pittsburg, Pa., Worcester, Mass., Savannah, Ga. At three points in Boston, Providence, and Toronto, Canada. In St. Paul, Minn., two to five insertions are made, and at Minneapolis, Minn., five.

Question 5. Is any bandage or dressing used to protect the point of inoculation?

In seventy cities no bandage or dressing is used. In only twenty-two is it the custom to apply one, and in seven it is sometimes used.

Question 6. Have you in your experience seen septic infection follow vaccination? In what proportion of cases does septic trouble follow vaccination?

To the first part of the question sixty-two had never seen septic infection follow vaccination, while twenty-six answers were in the affirmative. The statements in regard to the proportion of cases in which septic trouble occurs varied very much from five per cent. in Allentown, Pa., and three cases in three hundred and fifty in Newton, Mass., to one case of erysipelas in 30,000 in Providence, R. I.

Vaccination in England is controlled entirely by an act of the Privy Council, and is under the direct supervision of the Local Government Board. The public vaccinators are appointed by the guardians of the poor in the different parishes. The rules require the careful registration of all cases and the results in each case. In all primary vaccina-

tions such insertions of lymph must be made as will produce at least four separate good sized vesicles or groups of vesicles, not less than an inch from one another. The total area of vesiculation on the same day, in the week following the vaccination, should not be less than half a square inch. The rules advise against the use of any needless means of protection or of dressing to a vaccinated arm.

I have an answer to my letter from Dr. Robinson, public vaccinator of Birmingham. He says patients must come clean, no especial washing is done. Sometimes a boracic acid solution is used. No bandage is applied. The virus is inserted at two points on each arm. He has seen sepsis from filthy clothing and from wounds other than those of vaccination. He thinks sepsis occurs in about one to five or seven hundred from unclean applications.

In Glasgow, Scotland, there are no rules. Washing is only done when plainly needed. No other antiseptic precaution is taken. The lymph is inserted at from twelve to sixteen points. No sepsis is seen except from filth.

An answer from Belfast, Ireland, states they have no prescribed rules; that it is not the custom of vaccinators to wash the skin. The virus is inserted usually at two points, but frequently at three or four. No bandage is used. Sepsis only comes from gross carelessness and filth.

In Stockholm, Sweden, there are no regulations. They wash carefully. No other antiseptic precautions are taken. Five insertions of lymph are made on each arm. No dressing is applied. They see no sepsis.

In Amsterdam, there are no rules. No washing is done or other antiseptic precaution taken except to have clean instruments. The virus is inserted at ten points. No septic infection follows vaccination.

In Antwerp, there are no regulations. Washing the skin is sometimes done, usually no other antiseptic precautions are taken. From three to six insertions are made.

A dressing is used, cotton with a light bandage. Sepsis is very seldom seen; perhaps one case in 1,000.

In Hamburg the regulations for Germany are in force. Filthy subjects are not treated, but no washing is done. No other antiseptic precautions are taken, except to have aseptic instruments. The lymph is inserted at six points. No dressing is used. Septic infection can only come from impure lymph or from filth coming in contact with a ruptured pustule. Sepsis is very rare. Careful registration is kept of all vaccinations made and the result. The patient is required to report at the end of seven days, and anyone who does not report at the end of ten days without sufficient reason is subject to a fine.

In Berlin the regulations for Germany are in force. They sometimes wash the skin with soap and water, and sometimes with antiseptic solutions. They insert the virus at six points. They use no dressing, and see no septic trouble.

In Dresden the German regulations apply. The patients must come with clean arms and clean clothing, otherwise they are refused. The instruments used are sterilized. Three to five insertions are made on each arm. No dressing is used and no sepsis seen.

In Vienna they have the Austrian regulations. The arm is washed with soap and water, and a two per cent. solution of carbolic acid. They insert the lymph at two or three points on each arm, and use no dressing or bandage. No fatal case following vaccination is on record, but a relatively small number of cases of erythema, erysipelas or phlegmonous inflammations occur.

In all the departments of the city of Paris the vaccinating is under the direction of the Institute of Animal Vaccine. Vaccination is always done directly from the heifer to the patient.

It is a regular rule in all the Paris schools that the skin shall be washed. This precaution is becoming little by

little a custom with doctors. No other antiseptic precautions are taken. They vaccinate at two points on each arm, use no bandage, and never see sepsis.

In Lisbon, there are no rules. They seldom wash the skin and no antiseptic precautions are taken. The virus is inserted at three points on each arm. No dressing is used, and septic infection is rarely seen.

In Rome the regulations for Italy are in force. The skin is not usually washed, and the only antiseptic precaution is to use clean instruments. They vaccinate at two points on each arm. Usually no bandage is used, but sometimes a gelatine plaster is applied.

At the time of the Popes, when the humanized virus was used, syphilis was not uncommon. Now animal lymph is used no bad results are seen. Careful records are kept of the results of vaccination. The whole matter of supplying lymph is in the charge of the National Vaccine Institute. One regulation is that no one shall be allowed to use vaccine lymph that is more than ten days old.

The evidence I have collected shows important differences in the manner of performing the operation of vaccination in different localities.

Only a small proportion of public vaccinators take the precaution to wash the skin before vaccinating.

The number of points at which the vaccine lymph is inserted varies very much.

Marson's statistics based on 5,000 cases of small-pox in the London Small-Pox Hospital give the following results:

Classification of Patients affected with Small-Pox.	Number of Deaths per cent. in each class respectively.	Dr. MacCombie's statistics for 11,724 cases. Mort. p. c.
1. Unvaccinated	35.	
2. Stated to have been vaccinated, but having no cicatrix . .	23.5	
3. Vaccinated:		
a. Having one vaccine cicatrix	7.73	Good, 6.4 Indifferent, 16.7

b. Having two vaccine cicatrices	4.70	Good,	3.7
		Indifferent,	11.2
c. Having three vaccine cicatrices	1.95	Good,	3.7
		Indifferent,	7.4
d. Having four or more vaccine cicatrices	0.55	Good,	2.7
		Indifferent,	4.8
A. Having well-marked cicatrices	2.52		
B. Having badly-marked cicatrices	8.82		
4. Having had small-pox	19.		

In patients with one well-marked vaccine cicatrix the death-rate was 3.83 per cent. Among cases where it was badly marked the death-rate was 11.91 per cent.

In patients with two well-marked cicatrices the death-rate was 2.32 per cent. Among cases badly marked 8.34 per cent.

Dr. Seaton in quoting these figures says: "In regard, therefore, to the expectation of any case of small-pox turning out badly, the question is not merely whether the patient has been vaccinated or not, but also how he has been vaccinated."

Dr. Seaton and Dr. Buchanan, during the epidemic of small-pox in London in 1863, made observations on upwards of 50,000 children in various national and parochial schools and workhouses:

Classification of Children Examined.	Proportion marked with Small-Pox per 1,000 children in each class, respectively.
1. Having no vaccine marks	360. in 1,000
2. Vaccinated:	
a. Having one vaccine cicatrix	6.80 in 1,000
b. Having two vaccine cicatrices	2.49 in 1,000
c. Having three vaccine cicatrices	1.42 in 1,000
d. Having four or more vaccine cicatrices	0.67 in 1,000
1. Having cicatrix or cicatrices of bad quality	7.60 in 1,000

2. Having cicatrix or cicatrices of tolerable quality	2.35 in 1,000
3. Having cicatrix or cicatrices of excellent quality	1.22 in 1,000

The evidence is conclusive, as Dr. Seaton states, "that the liability of any individual to take small-pox severely after vaccination, and probably the liability to take it at all, will be inversely as the goodness and amount of the vaccination."

He also says: "To produce at least four perfect vesicles, leaving four characteristic cicatrices, should be the aim of every vaccinator."

Dr. J. S. Billings writes me: "The character of the vesicle is more important than the number, but there seems to be a definite relation between the extent of surface involved in the vesicle or vesicles to the amount of protection afforded."

With such strong evidence as I have quoted in favor of multiple vaccination, it is astonishing that in fifty-one out of ninety-seven cities in the United States it is the custom to vaccinate at only one point.

It is proved by statistics that such vaccination does not give the protection from small-pox that vaccination is capable of doing.

There has been lately a great outcry against severe vaccination. This comes, perhaps, from the fact that small-pox is so uncommon, the public and physicians also have almost forgotten what a terrible disease it is. Anyone who has seen small-pox in an unvaccinated subject must hold the opinion that no vaccination can be too severe if its severity aids in protecting the individual from this disease.

In regard to a dressing, I think it much better to use one in spite of the almost universal custom of public vaccinators not to do so. It is certainly most desirable that the vesicles should not be ruptured and the crusts should be allowed to dry up: but, I think, a small dressing of

sterilized gauze and a light bandage help very much in securing this object. Any form of adhesive plaster is, I think, very injurious. Primary sepsis, that is sepsis immediately following the operation of vaccination, I believe does not occur. The bad results are all secondary, caused by the infection of broken vesicles or pustules. Such complications can be avoided if the points of inoculation be kept perfectly clean by an aseptic dressing through the whole of the process. Septic infection from vaccination is certainly surprisingly rare considering the careless way in which vaccinations are made and the cases left to take care of themselves. It is my opinion, however, that sepsis to a greater or less extent is more common than statistics show. I have noticed that the smaller cities have reported a larger proportion of cases. This may be because in the larger cities the cases are lost sight of. A careful record ought to be kept certainly of each public vaccination, and the result. This is especially important when our lymph comes to us, as it does, from private individuals and about the freshness of which there is often doubt.

In a communication from the secretary of the Local Government Board the following statement is made in regard to the occurrence of sepsis and the use of dressings after vaccination: "The official data on these matters have been stated in evidence before the Royal Commission on Vaccination which may be expected shortly to issue its report." This shows the English authorities have considered these matters of sufficient importance for investigation by a royal commission.

Except in epidemics of small-pox, children should only be vaccinated when in good health. Cutaneous eruptions of all kinds are a contra-indication.

Vaccination should be done with the same care as any minor surgical operation. The skin should be carefully washed with soap and water.

The vaccine lymph must be fresh, certainly not more than one week old.

The virus should be inserted at more than one point. The point of inoculation should be kept perfectly clean throughout the whole course of the disease, and protected from friction. The patient, meanwhile, should be considered as suffering from a mild disease.

My observations show that public vaccination in this country is not, as a rule, done as it ought to be. The question of a proper technique for vaccination is a matter of very great importance, and the whole subject needs careful investigation and revision.

RADICAL DIFFERENCES IN METHODS OF PRODUCTION AND CULTIVATION OF VACCINE LYMPH.

BY SAMUEL W. ABBOTT, M.D., WAKEFIELD.

In this paper I shall point out briefly some of the different conditions under which vaccine lymph is cultivated and produced for the purposes of vaccination, at the present day, having special reference to that which is termed animal or bovine vaccination.

Biologically speaking, all vaccination is animal vaccination. At the present day vaccination with non-humanized or bovine lymph is the rule in the United States, and probably 90 per cent. of all vaccinations throughout the country are made in this manner. With the exception of the infinitesimal liability to infection by syphilis or other human disease, as was conclusively proven by Dr. Cory of London, in July, 1881, by submitting himself for experiment, there can be no objection to the method with humanized lymph.

In many countries of Europe humanized vaccination is practised to a considerable extent. The old Jennerian method had taken so strong a hold in England that it is not an easy task to change it. Another reason exists in the peculiarity of the English law, which requires every child vaccinated at the public expense to be presented again to the vaccinator for inspection at the end of a week, under a penalty of £1, the vaccinator having the legal right in every case to obtain a supply of lymph from the child for future use. The tendency of this law is to make the

change from humanized to non-humanized lymph somewhat difficult. The use of bovine lymph, however, is steadily gaining ground in England.

In France, on the contrary, the fact that it was lawful to pay to the mothers of children a fee of several francs for the privilege of taking lymph from the arms of infants may have been one of the minor causes which proved a hindrance to "arm-to-arm" vaccination, and may have led to the more rapid introduction of animal vaccination.

The greatest advance in use of calf lymph in foreign countries has been in Germany, where the ratio of such lymph used increased from about 2.5 per cent. in 1879 to 7 per cent. in 1882, and then still more rapidly to 78 per cent. in 1888, and 89 per cent. in 1889, and will probably soon entirely displace the use of humanized lymph.

The radical differences in the methods in use in different countries for the production of calf lymph may be stated as follows: —

1. The existence to a greater or less extent of *government supervision or control* in nearly every foreign country.

In England the Local Government Board, which constitutes the general sanitary authority of the country, established a station in London about 12 years since, which has been constantly under the supervision of Dr. R. Cory.

In Belgium a national Vaccine institute was established by the government in 1865, under the direction of Dr. Warlomont, who is one of the highest authorities on the subject in Europe. His works are accepted as standards as to the technique of calf vaccination.

In France Dr. Lanoix introduced the practice in 1865, having learned its value from Dr. Negri of Naples while the former was on a visit to that city. As a result of the efforts of Dr. Lanoix several private establishments followed the introduction of the practice at Paris, and some of the French cities have establishments maintained at the

public cost. There are also one or more societies in Paris which maintain calf vaccination and furnish vaccination free to those who apply for it.

In Germany the government provides by law for the establishment of public stations for the production of calf lymph in all of the large cities, at present 25 in number. It also provides for the general supervision of all these establishments under the most careful and minute regulations. Each establishment is required to give an annual report of its operations, a summary of which may be found in the reports of the Imperial Board of Health. These stations furnish annually enough lymph to vaccinate about two million persons.

Similar, though not so careful regulations exist in Holland, Austria, Italy, and in Japan.

Contrast with the foregoing statements the methods in vogue in the United States. With the exception of one station in Minnesota, now successfully conducted under the direction of the State Board of Health by Dr. Hewitt I know of no establishment which has any supervision whatever.[1] As a consequence there must be a great diversity in the methods employed and in the material produced.

2. *Vaccine Lymph as an article of commerce or trade.* Partly as a consequence of submitting quietly to the method of production of vaccine lymph by private parties in this country, the business has become very largely commercial in its character, the private producer conducting his operations in such a manner as to secure the greatest possible returns with the least possible outlay of money. Vaccine lymph is bought and sold, and competition in prices naturally leads to deterioration in the quality of this important article, which should be freed from every influence which may in any way lead to its impairment. But the

[1] At the time of writing this paper this statement was correct.

danger lies not only in the fact that it is an article of commerce, but still more in the *methods* of its sale. The business is entrusted to druggists, middlemen and traveling agents who solicit orders very much after the manner in which boots, shoes, dry goods and patent medicines are sold. But vaccine lymph is an extremely perishable article, while dry goods are not. As a consequence of this method of sale, vaccine lymph often remains for weeks or even months in the drawers and unbroken packages of the middlemen or agents, and when needed for use the guarantee of the producer is disregarded, and the lymph of several weeks or months ago is sold and finally used for vaccination. As a result it proves inert, and the consequence is charged to the insusceptibility of the infant or vaccinated person. As a matter of fact, when vaccination is conducted under the best possible conditions of fresh lymph, insusceptibility is found not to exist, or at least to be a matter of the rarest occurrence. Dr. Cory stated that he had vaccinated nearly 50,000 infants with but one unsuccessful result, and in this exceptional case the usual opportunity for repeated trial was not afforded. (See Second Report of Parliamentary commission, 1890, p. 142.) If such vaccinations are being made during a brisk epidemic of small-pox, and in families which have been exposed to the disease, it may happen that some children will take the disease and die, during the delay occasioned by waiting to ascertain whether the lymph of uncertain source and age will prove successful or not, and thus the practice of vaccination falls into disrepute. Guarantees, it is true, are given that a new supply will be furnished in case of failure, but of what avail is a guarantee if the exposed person meanwhile contracts small-pox and dies while trying the experiment of waiting to see whether the old lymph will "take" or not?

Now, one remedy for this condition is the abolition of middlemen, the procuring of lymph direct from the pro-

ducer, and the stamping of every package of lymph with the date of its collection — an improvement which cannot very well be accomplished under existing conditions in this country. Government production can do away with the incentive to profit, and furnish the lymph either at cost or free of all cost. The question of expense ought to be the last consideration which should be allowed to interfere with the production of an absolutely faultless lymph.

In an excellent paper by Dr. Harvey Reed of Ohio, some of these points are highly commended. (See Monthly Record, published by State Board of Health of Ohio, Vol. vii. p. 97, 1894.)

3. *Methods of insertion and implantation.* Bovine vaccination is initiated in the heifer or calf by several different methods, or rather from different sources: —

(*a.*) By the introduction of humanized lymph taken from the vesicles of a primary vaccination.

(*b.*) Animal lymph, subject to the same conditions as humanized lymph: —*i. e.* direct or fresh lymph dried upon quills or ivory points, or mixed with glycerine and carefully preserved.

(*c.*) The solid and fluid parts of the so-called natural cow-pox.

These are the methods advised by the German government in its law of April 28, 1887, and as may be seen, preference is given by this law to the use of humanized lymph for the purpose of initiating a series of calf vaccinations. If this government gives such counsel, a government which does not enact laws except upon the basis of careful observation and experiment, and employs for its purposes men who are acknowledged experts, are we to blindly follow the statements of those who have taken up this line of work merely as a source of profit or trade, and without giving scarcely a thought to the scientific side of the question?

There has been much speculation upon the question whether small-pox and cow-pox are one and the same disease, the latter being only a modification of the former, and this speculation has continued for a century. But the brilliant discoveries of modern bacteriology throw a flood of light upon the question, by experiment, by observation and by analogy. We are forced to conclude that vaccinia bears very much the relation to small-pox, after transmission through the cow, that attenuated rabies after transmission through the rabbit bears to the exceedingly fatal and virulent disease in the dog, or that anthrax after successive attenuations bears to the extremely fatal disease in its natural form, as was demonstated in the most brilliant manner by the experiments of Pasteur upon a herd of sheep and cows at Melun in 1881. All these experiments are only applications of the process of artificial selection by the hand of man to those organic bodies known as bacteria by the proper use of soils and methods of cultivation. And if it is possible to diminish the virulence of infectious processes by such methods while the protective power still remains, is it not also possible by certain methods to re-establish the original virulent characteristics, while still retaining the protective power? Or, if those original virulent properties are not re-established, may not other and abnormal processes of a dangerous character be established in their place?

At a meeting of the Suffolk District Medical Society in February last, a committee which had witnessed the process of animal vaccination at some establishments in this State, stated that animals were being vaccinated by means of large scarified patches, each of which would cover an area of several square inches, and were more or less exposed to soiling by the excreta of the animal. It is a question worth considering whether this plan continuously pursued may not in time re-establish to some extent the serious characteristics of the original disease.

There is no clear evidence to show that cow-pox originates in the cow. The mere fact that casual cases of cow-pox are to be found in the cow proves nothing. To call them "spontaneous" is contrary to all progressive knowledge as to the natural history of infectious diseases. One might as well call an oak tree in the forest "spontaneous" because he cannot find the acorn from which it was produced.

In 1870 or 1871 great pains were taken to import vaccine lymph from Paris for the purpose of animal vaccination, and the name "Beaugency" curiously enough became a symbol of purity in this important article, as though this infectious disease "cow-pox" was unknown except in foreign lands, and yet at that very time dairymen within a dozen miles of this city were separating infected animals from their herds to prevent its further spread, being themselves familiar with the peculiar characteristics of the disease.

Let us now consider for a moment the following points, which have a direct bearing upon the natural history of casual small-pox. By the term "casual" I mean those cases which have been occasionally found among dairies, and were not intentionally inoculated, that is to say, vaccinated for the purpose, either of experiment, or for the production of an increased quantity of vaccine lymph.

a. Casual cow-pox in the cow usually occurs during epidemics of small-pox among men. All of the cases which I find on record in this country for the last half century, about forty in all, occurred in years of small-pox epidemics. In Europe its occurrence was still more frequent in the early half of the century. It still occurs in Gloucestershire where Jenner first saw it, but not so often as in his day when small-pox was much more common than now.

Ceely's cases, recorded in his papers, occurred in 1838, a year in which there were 16,000 deaths from small-pox in England. One case is recorded in which some old

clothes, stripped from a small-pox patient, were thrown into a meadow where cows were feeding; and the cows, having access to the clothing, were attacked with cow-pox.

The famous so-called spontaneous case at Beaugency occurred in the French department of Loiret in 1866. In this same department, during the ten years 1861–'71, there were more deaths from small-pox in a population but little greater than that of Essex county, than there have been in the whole State of Massachusetts in the past twenty years, in a population of 2,000,000 or more. Now when we know from the experiments, not only of early observers but of quite recent experimenters such as Haccius, Eternod and others, that vaccinia may be induced by the inoculation of small-pox upon animals, is it strange that such cases should occur casually in times of epidemic?

b. There is no evidence that cow-pox occurs among animals in the wild state. No doubt, it may be induced among them, but I find no record of its casual occurrence among them. Buffaloes are susceptible to inoculation with vaccine lymph, when artificially introduced.

c. Casual cow-pox does not occur among bulls. (Ceely.)

d. It does not occur among cows which are dry. (Ceely.)

e. There is no evidence that cow-pox is transmitted from one animal to another in herds except through human agency.

From these facts it would appear that cow-pox occurs, not only among those animals which are associated with man, but with those which are associated with him in the most intimate and daily contact and handling of the animal; and it is manifested upon those parts of the animal which are chiefly exposed to such contact; such a contact, in fact, as would be likely to impart infection to her by the hands, provided such infection should in any way be possessed by the milker.

In the case of horse-pox, a disease of the heels or hoofs, what part of the horse is more often touched by human hands than his hoofs or heels?

The cow is, therefore, simply our ally or efficient helper in the great scheme of disease prevention, enabling us for the time being to employ her as a means of procuring, cultivating, multiplying and diminishing the virulence of the proper means of defence.

So also the rabbit plays no part in the natural history of rabies, but yet acts as an important ally in preventive treatment.

I speak of these points because too great importance has been attached, in this country, to the comparatively unimportant question of pedigree, or stocks of animal lymph, to the exclusion of far more weighty questions which have been neglected.

But to return to the question of the best mode of insertion or implantation of lymph in the animal.

Three methods are chiefly practised:—

a. Puncture, *b*. Incision, and *c*. Scarification.

These terms are in themselves sufficiently explicit as to the modes of insertion. In foreign establishments the first two methods are chiefly practised, though scarification is also sometimes employed. In an inspection of certain continental establishments which Dr. Murphy made for the Local Government Board in 1883, he found that in the Dutch establishments vaccination by puncture had entirely taken the place of incision, for the reason that the "vesicles resulting from incision have a greater tendency to become advanced and purulent than those resulting from puncture". In Brussels incision is still practised.[1]

The incisions referred to are not more than 10 to 12 mm. in length, and 4 to 5 mm. in depth. Now, if incisions were abandoned for reasons of this character, what can be

[1] 13th Annual Report of Local Government Board, Supplement, p. 27.

said of the method by scarification in practice in some places in this country, where many surfaces having an area of from one to four square inches (6 to 25 cm.) are inoculated? These scarifications, too, are allowed to progress two days beyond the usual period advised by the best authorities, and are made in a region where the daily soiling of urine and feces may have free access to the scarified surfaces. These large surfaces are attended with swelling, not only of the surrounding integument, but also often of the neighboring lymphatic glands, and if there is any reason for imitation of natural processes, that is to say, in the production of vesicles like those of variola, having a diameter of 5 to 12 mm., then a process of scarifications of large size carried on through 500 to 1000 generations as has been done, may in time reproduce a severe type of vaccinia which shall possess far more virulence than the form with which we have for a long time been familiar.

4. *Age of animals.* Unvaccinated bovine animals of any age are susceptible to cow-pox artificially implanted. As a general rule the average age of animals used for purposes of vaccination in the United States is greater than that of animals used in most foreign countries. At two of the establishments in Massachusetts adult animals, or at least animals over one year old, are used, and at two others calves of three to eight months, while in several establishments in other parts of the country animals varying from six months to two years are employed.

In two or three small German cities heifers of one and two years are employed, but in most of the German establishments the average age is about three months. The law upon this point reads as follows: "Section 2. Older animals are only to be used when calves cannot be had. The calves should be at least three weeks old . . . calves of five weeks old and upward are to be preferred." Law of the Bundesrath, April 28, 1887.

The average age of calves used in Holland, as stated by Dr. Murphy, was "3 to 5 months." Those used at the principal station in London are about five months old.

Warlomont states the question by weight and says that the calves should weigh at least 100 kilogrammes (about 220 lbs.) each.

Vaillard says: "Il y a cependant un reél avantage à utiliser de préférence les jeunes sujets, âgés de deux mois et demi à trois mois."

From the point of economy there are some advantages in the use of adult animals. The chief end secured is the increased product of lymph.

This is offset to some extent by the increased cost of care and food.

On the other hand, the advantages of employing young animals are mainly those of convenience and sanitary security. Young animals can be more conveniently handled and are almost absolutely free from the danger of tuberculosis.[1]

Vaillard further says: "Out of 21,320 calves slaughtered at Augsburg not one was tuberculous, while out of 10,988 horned adults 321 or 2.9 per cent. were tuberculous. At Munich there was scarcely one tuberculous calf in 100,000, and at the slaughter house at Lyons the record showed only five tuberculous calves out of a total of 400,000 animals in a period of five years."

In summing up this phase of the subject, then, the transmission of the infection of tuberculosis is rendered extremely improbable by the following facts: —

a. By reason of the age of vaccinifers, calves or young animals are chiefly used. The young of the bovine species are more exempt from tuberculosis than the young of the human species.

b. Supposing an animal to be tuberculous (that is, hav-

[1] Vaillard. Manuel pratique de la Vaccination Animale.

ing tuberculous organs), there is but little reason to believe that the tubercle bacilli will be found in the serum of vaccine lymph taken from the integumentary portions of the animal.

c. Finally, if the vaccine lymph should actually contain tubercle bacilli, experiment has shown that, by the ordinary methods of superficial insertion, there would be no danger of implanting the germs of tubercle where they would infect the subject, since tubercle bacilli can only be successfully transmitted by deep inoculations, not by superficial scarifications.

Upon this point, then (the age of animals), the preference does not appear to be a matter of so great importance as might at first thought be supposed. But, all things considered, animals of less than one year of age ought to be employed.

Bovine animals, it is true, are subject to other diseases beside tuberculosis, but it does not appear that there is danger of their transmission to man by means of vaccine lymph.

5. *Time of collection of lymph.* In no point does American practice, so far as I can learn, differ from that of foreign establishments so radically as in the time which is allowed to elapse between the vaccination of the animal and the collection of the lymph. In the United States the older vaccinators, following blindly the same practice employed for collecting lymph from infants, as a rule established the custom of taking the lymph at the end of a week, and this has become almost an established rule of practice, with possibly some exceptions in which collection has been made a day earlier. A better way of expressing the time, in order to avoid ambiguity, is to state it in hours, as multiples or fractions of 24. The average time in practice in the United States then may be stated as 7 times 24 hours (168), or in exceptional instances $6\frac{1}{2}$ times 24 (156) hours from the time of insertion, while the average

period in Germany, Holland, Belgium and England is at least as brief as 5 times 24, or 120 hours. This custom in the last named countries has been established as the result of careful observation, and experiment of a very large number of observers, most of whom are acting under government supervision and have nothing in view but the absolute welfare of the community, independent of pecuniary considerations.

The practice of short periods has certain decided advantages:—

a. The shorter the time the less the liability of the vesicle to become purulent at the time of collection.

b. During a period of four, five or six days the vesicle is much less liable to become ruptured or infected from without than when it is allowed to continue to the seventh day (168 hours) before the lymph is collected. This is a matter of vital importance, and when viewed from a bacteriological standpoint, involves to a very considerable extent the purity of the lymph produced.

The *disadvantage* of short periods, when the question is viewed from the standpoint of private ownership of vaccine establishments, consists in the fact that the quantity of lymph to be obtained from a vesicle or group of vesicles at the end of 120 hours from the time of insertion of lymph, is very much less than that which can be obtained from the same vesicle or group of vesicles at the end of 168 hours when the vesicle has attained a greater size and degree of development. This is, however, a purely economic and not a sanitary view of the question.

6. *Disinfection. Cleanliness.* The term "asepsis," as sometimes used in connection with this important work, may almost be deemed to be synonymous with absolute cleanliness in every detail.

Vaccination is itself an infective process, hence the use of disinfectants, if they are used at all, must be intelligently

conducted, and they should be so employed that nothing of a disinfectant character can touch or enter, or otherwise affect the lymph itself during the process of collection or afterwards. Not only should the buildings themselves be constructed of materials which will admit of thorough cleaning, but the administration should be such that the animals shall have the best possible care, grooming and feed; the stalls, floors, mangers and walls must be kept clean, the excreta frequently removed, the operators and attendants must have scrupulously clean hands, and all instruments used should be thoroughly cleansed in boiling water after each use.

The following provisions of the German law of 1887 relate to this subject and are worthy of general adoption.

Section 14. All of the implements used in vaccination and the collection of lymph, as well as those used in the subsequent handling and transporting of it, must be of a material and shape permitting thorough cleansing and disinfection. They must be used for one purpose only, and before and after each use they must be cleansed and disinfected when necessary.

Section 16. The surface selected for vaccination must be shaved and thoroughly washed with soap and warm water. Afterward it must be disinfected with a solution of mercuric perchloride (1 to 1000), or a three per cent. solution of carbolic acid, and finally rinsed with boiled water.

7. *The slaughter of animals before the use of lymph.* This practice, so far as I have any knowledge of the question, is not carried out in the United States. It has, however, been the rule for many years at the Belgian Institute under the charge of Dr. Warlomont.

All possible danger of suspicion as to the preparation of animal vaccine may be removed, "by delivering it only after the animal from which it is taken has been proven by

autopsy to be perfectly healthy. This is a precaution that should not be neglected." (Warlomont.)

Here again the German law is quite explicit, and reads as follows:—

Section 5. After taking the vaccine lymph the animals must be killed and examined by a veterinary surgeon. The examination should especially be directed to the condition of the navel and of its vessels, the peritoneum and pleura, the lungs, liver and spleen.

Section 6. The veterinarian must give a certificate of every examination.

Section 7. The lymph must only be issued to the vaccinating physicians when the autopsy shows that the animal was healthy.

The following section of the same law, although not related to this special subject, shows the general progressive character of modern legislation in Germany in this direction.

Section 33. The public vaccine establishments are in duty bound scientifically and practically to improve vaccination, and consequently to carry on investigations by way of experiment, clinical observation, or otherwise.

In summing up this phase of the subject, then, I believe that improvement may be made in the production of vaccine lymph in this country by the adoption of the following general and special measures.

1. Cultivation and production of vaccine lymph by the United States Government for the use of the Army, the Navy and the Marine Hospital Service, and for all public institutions managed by the government.

Each State to produce its own lymph for the use of its public institutions and for the use of all local boards of health of cities and towns.

2. The abolition of agents and middlemen and the issuing of lymph directly from the producers to the parties

who use it, every package to be stamped with the date of its collection.

3. The employment of better and more uniform methods of inoculating animals.

4. The exclusive use of animals less than one year old.

5. Limiting the time of collecting of lymph to a period of five days, or at the outside to six days from the date of its insertion.

6. The adoption of careful rules for every establishment relative to cleanliness, the care of animals, etc.

7. If adult animals are used, a requirement that they shall be slaughtered before the lymph is issued.

DISCUSSION.

Dr. J. F. A. Adams, of Pittsfield.—It seems to me that it is certainly unnecessary to say anything more to prove the value of vaccination as a preventive of small-pox. I am delighted with the interesting, valuable and scientific papers read here today. They cover the ground ably and thoroughly.

I regret to say that it is my experience, and the experience of every practising physician, to meet daily many very intelligent people who object to vaccination. They believe in every kind of humbug, Christian scientists, and so on, but they do not believe in vaccination.

I think these people need a scare. We have so little small-pox, not having had an epidemic for a good many years, that they are not so much afraid of it. I have in mind one very intelligent lady, a temporary resident in my city, who refused to be vaccinated.

Objections could be raised with a great deal more force to the effects of public sewerage. Sewer gas does produce a certain amount of harm, and its effects are much worse than those of vaccination. But we must have sewers. We hear of people being run over and injured by fire-en-

gines; but these are necessary to the extinguishing of fires, and should people object to their existence and use they would be laughed at.

The State requires everybody to be vaccinated, and I think the State ought to guarantee the virus we use. It ought to inspect or supply it. In this way we would know just what we are using, and the danger of unknowingly using septic material would be averted. Every physician ought to be able to obtain his virus from some reliable source. You may say: "Well, there are many reliable places from which to obtain the virus". Yes, that is true, but the market is full of all kinds, good and bad, and the beginner does not know whose virus is good and whose is bad. There should be some public officer appointed, whose duty should be to inspect the virus, and thus we should have a guarantee. For myself I can say that during the twenty odd years I have been in practice, I have used animal virus with perfectly satisfactory results.

Dr. L. F. Woodward, of Worcester.—I join Dr. Adams in expressing thanks and admiration for the excellent papers read. I think the subject has been covered exceedingly well, with one exception, and on this particular point I shall speak. I think the law on the statute books is ample. Any child or adult can be vaccinated at short periods. But throughout the state that law is rarely enforced.

In my own city vaccination is never enforced till the child is about to enter school. Then, at about the age of five years, the child is presented for vaccination for the first time. Very few have been vaccinated before. A certificate of vaccination is accepted from any one. The only man that discriminates at all in this matter is the superintendent of schools. Certificates are accepted from non-medical men. An exasperating case of this sort came to my notice, where a child had something put on the tongue and a certificate was given. What can you do in such cases? Under the law no penalty is fixed. Unless there is an outbreak of small-pox in the vicinity of the school, these children are not vaccinated again during their school course. During the last six months we have had twelve cases of small-pox in Worcester.

In speaking of the number of insertions, it has been interesting to note the nationality of the children by the number of scars. The Swedes always could show anywhere from eight to fifteen scars on both arms.

Dr. J. B. Field, of Lowell.—I think every one here believes in the efficacy of vaccination. What a pity that some of our patients who do not believe in the protective power of vaccine cannot be here and listen to what has been said. They certainly would be convinced that vaccination does prevent small-pox. Pure virus, introduced into a clean arm by a clean operator, certainly does prevent small-pox.

Referring to the question of sepsis following vaccinations, I have been surprised at the comparatively few poor results we have had at Lowell. In our city there are a great many mill operatives. The mill owners vaccinate their employees. We ask them to do it every six or seven years, and they do so.

During last December and January about 26,000 people were vaccinated by the corporations and the Board of Health, about 30% of our population. Out of that number there were not over half a dozen cases of sepsis to my knowledge; and when I found out how these young physicians did their work, with dirty hands, vaccinating dirty arms, and then licking a piece of plaster on their tongue and directly applying it over the vaccinated part, I was, to say the least, greatly surprised.

We ought to vaccinate oftener. We should not wait till an epidemic is staring us in the face. Then we have to do our work more hurriedly and less thoroughly than it ought to be done.

I agree with Dr. Abbott that we ought to know what kind of virus we are using. As he says, a patient may die from small-pox before we know whether the virus we are using is good or not.

As physicians we do not do our duty in this respect. I was present at the State house, by invitation of Dr. Abbott, during the hearing accorded the anti-vaccinationists. We ought to be just as earnest in defending the cause of vaccination as these people are in opposing it; but it is not the case. We should tell our patients that their children

ought to be vaccinated in infancy, not to wait till they are sent to school. We ought also to tell them that they should be vaccinated more than once. They ought not to wait till an epidemic confronts us before getting vaccinated again.

Dr. F. C. Martin, of Roxbury.—Dr. Swift's paper was especially interesting to me. He referred to the number of insertions on the arm. This varies, as we all know. The tables which Dr. Swift referred to are largely made up by men who used humanized virus, and whose work was done prior to 1866, *i. e.* prior to the time that the new case of spontaneous cow-pox was discovered at Beaugency, and the virus brought to Paris and to this country, and which is the virus that has grown into almost universal use in America.

In regard to what Dr. Swift has said about the number of insertions. At first the Jennerian virus was found to be very active. The symptoms described were very severe. As time went on these symptoms grew less and less severe, and it was decided to increase the number of insertions up to six. This was done by the Royal Vaccine Institution of England.

At Passy, in France, it was found that the effect of bovine virus was very much more marked than that of the Jennerian. The tendency in England is to stick to the old lymph, and increase the number of insertions. The practice of using animal virus is more in vogue in this country than anywhere else in the world. It is used almost exclusively both North and South.

I have always found, and I believe, that with good animal virus, two insertions on one arm only is ample protection. This is the principle which my father advocated, and which has been practised by most of the profession in America during the last twenty-four years, and I have never heard of a single case of small-pox following a vaccination where two thorough insertions were made on one arm with cow-pox lymph.

Dr. Abbott, I think, said in his paper that there was nothing to prove that the protective power of the old Jennerian lymph was any less than that obtained from bovine lymph. I should dispute that assertion very decidedly. The fact

that, as time went on, more and more insertions had to be made, would show that it was losing its protective power. The experiments at Passy showed a great difference in the results obtained from vaccination with humanized and bovine lymph. The difference was extremely marked in the character of the vesicles and the cicatrices. It is possible that they do in some parts of this country keep up the practice of the Jennerian lymph, but it must be very rare now-a-days. It may be that many object to cow-pox lymph because the arms are sorer. I have seen a good many sore arms, but, as Dr. McCollom has said, there has been no instance known, of late years at any rate, where any very serious results have followed vaccination. The instance of "Animal Vaccination," referred to as occurring in America prior to 1870, were all cases of *retro*-vaccination, that is, vaccination of animals from humanized virus, which is a very different thing from "True Animal Vaccination," which has never passed through the human system.

Dr. F. E. Corey, of Westboro'.—There ought to be some means of determining the quality and freshness of the virus we use. My experience in the use of bovine virus, no doubt in common with that of other physicians, is very unsatisfactory, for the reason that fresh virus is not supplied. To be sure the packages are marked to the effect that another supply will be furnished if that particular one proves inert. But what excuse is that to offer to patients? They get thoroughly disgusted, and lay the entire blame for the vaccination not taking on the physician. I have sometimes had to vaccinate four or five times before I got a point that would take—I mean from four or five different supplies. We ought to demand that the dealers place upon their envelopes the date at which the virus was taken from the animal.

Dr. Wesley Davis, of Worcester.—Dr. Corey expresses exactly my views. I want a virus that I can rely on. When animal virus came into use at first I gave up the use of humanized virus entirely, but I found it would not take. Several attempts were necessary. The conclusion I came to when I found a point that would take

was that an occasional fresh one found its way into the package. I believe in the use of animal virus when you can get it fresh, and when it will take. But my experience has been that it is not often you can get it to take. You get disgusted and your patients get disgusted. I always get good results from humanized virus.

Dr. S. W. Abbott.—The best medical knowledge upon this subject does not come from the French, but from a government which never does anything by halves, the German government. They would never have enacted the law relating to animal vaccination without having first carefully considered it.

There is one place in this country, Providence, R. I., where the Jennerian lymph has been transmitted down to the present time by the authorities, through a long series of infants.

I do not know as it is generally known, but there is one member of this Society still living, Dr. John Yale, of Ware, Mass., who vaccinated animals as long ago as 1853 or '54, and vaccinated children from the heifers. Bovine lymph was used quite largely during the war, for vaccinating soldiers. The report upon this subject, by Surgeon Milhau, can be found in the Army Medical reports of the Rebellion, in the third medical volume.

Dr. Z. B. Adams, of Framingham.—Speaking of the Jennerian virus, I vaccinated the whole of the Seventh Massachusetts Regiment, in 1861, from two little scabs sent me by the Surgeon-General at Washington. We had an outbreak of small-pox.

I pulverized them in a mortar, I then mixed a little glycerine with them, making a paste, and this paste was used to vaccinate the men. Every man was vaccinated. This is absolutely true. After scraping each man's arm, some—a very little to be sure—of this paste was introduced, just rubbed on, and the man was passed along, and another took his place, till the whole regiment was vaccinated. A piece of court-plaster was placed over the part. Over 75% took. I doubt if you could get so good a result from the bovine virus.

Dr. Swift.—The question of the number of points of insertion is a very important one, I think. I should be very glad to believe that one perfect vesicle would give as great amount of protection as multiple insertions, but the statistics which I have here given seem to disprove that, so far as humanized virus is concerned at any rate. I know of no absolute statistics which prove that bovine virus has any greater protective power than human virus. It is difficult for me to understand why multiple vesicles give more protection than a single one. Vaccination produces a constitutional disease, and I fail to see why one vesicle should not do the work.

I notice in Keating's Diseases of Children, three or four abrasions are recommended. Osler speaks of one or more. In Pepper's System of Medicine two insertions are recommended. The text-books, as you see, give us no agreed or definite information on the important matter of the number of insertions.

Dr. J. F. A. Adams.—It has been claimed here to-day that bovine virus does not always work. I have been informed by Dr. Martin that the virus dried on the ivory point is not very soluble, and must be rubbed very hard into the insertion. It has been my practice to dip my point into hot water, and rub hard with both sides of it. I think it is not the fault of the virus, but of the technique of vaccinating. I always use bovine virus with success.

Dr. McCollom.—It seems to me that animal virus offers a better protection than humanized virus.

The point to which Dr. Adams alluded is worthy of consideration. You must be sure to dissolve your animal virus. It ought to take as readily as humanized virus.

Dr. Davis.—My invariable practice has been in using animal virus to dip the point of my quill in water, then scarify the arm, and then rub it in thoroughly until the point is clean. Yet with all this precaution I get poor results.

A few years ago we had an undeveloped case of smallpox appear in our city hospital at Worcester. It remained in the ward twenty-four hours among a lot of patients.

The case could not be moved till the afternoon, it taking that length of time to get the Board of Health machinery to move. I looked over my books and saw where eight days before I had vaccinated a little child. I at once got some of this virus, and everybody in the ward was vaccinated with it successfully. I presume that virus was four or five removes from the cow, and with such virus I feel safe.

To me it seems an important point that the physician should have some absolute means of knowing how fresh his animal virus is. I believe in fresh bovine virus.

Dr. F. C. Shattuck, of Boston.—It seems to me that Dr. Davis's suggestion regarding the necessity for physicians knowing how fresh their virus is, is a good one. Every envelope should be dated when it is sent out.

ARTICLE XIV.

THE CURE OF CARCINOMA OF THE BREAST BY RADICAL OPERATION.

By WILLIAM T. BULL, M.D.
OF NEW YORK CITY.

READ JUNE 12, 1894.

THE CURE OF CARCINOMA OF THE BREAST BY RADICAL OPERATION.

OBSERVATIONS IN ONE HUNDRED AND EIGHTEEN CASES.

The following series of cases occurring between the years 1880-1894 are offered as testimony to the value of the modern radical operation in cancer of the female breast. In every instance but one, the diagnosis has been confirmed by microscopical examination, for which Dr. Frank Ferguson, Pathologist to the New York Hospital, has been responsible in the majority. To the tracing of the cases through this number of years, and keeping the records up to date, Jan. 1, 1894, Dr. Charles A. Powers, Surgeon to St. Luke's and the New York Cancer Hospital, has given much time and enthusiasm. He has been associated with me in the care of many of these patients during the past five years. To his efforts is due the circumstance that but three of the 118 cases have been lost sight of, a smaller percentage than is noted in any other record. Weir, for instance, traced but 60 of his 125 patients. Dennis was able to keep sight of but 33 of 71, and Curtis (New York Medical Record, No. 24, 1894) in collecting the statistics of eight foreign clinics, gives final results in only 813 of a total of 1213 cases.

In the matter of etiology, trauma, previous inflammation, heredity, and age, are found to play about the same role as is mentioned by other observers. There is no noteworthy difference from other statistics; and in these particulars as

well as in such details as the part of the breast affected, the relative frequency of the right or left breast, this series gives no information of practical value. In passing I may, however, note the fact, that of thirteen cases in which cancer existed in the previous generation, eleven were found among the recurrent and two among the cured cases; and furthermore, that I have taken no notice of the item of duration of the disease before operation, because the data in most instances is so untrustworthy. I have excluded all cases of secondary operations (about 20 in number) performed on patients with whom I had no previous experience, and have no records of patients in whom no operation was advised.

The practical value, then, of this record is in its showing as regards the question of cure, to which only a portion of the cases contribute, because not all operations have been complete or radical in character. As incomplete operations, which are ten in number, performed in the years 1880 to 1884, I include those in which the breast only was removed primarily; as complete, those in which the breast was excised together with a liberal amount of skin over it, the fascia of the pectoral muscle and the glands of the axilla embedded in their fat. This thorough and admirably planned operation was first suggested by Moore, then advocated by Banks in England, popularized by Volkmann in Germany, and warmly supported by Gross in this country; and it is now, I believe, generally adopted. It has been performed in 108 cases without reference to the condition of the glands as determined by examination prior to the operation.

The ten incomplete operations were all followed by recovery; the 108 complete operations include four fatal results, the cause of death being in two cases erysipelas, in one chronic nephritis and pneumonia, in one acute sepsis and pneumonia. This is a mortality of 3.6%. Curtis,

above quoted, finds a mortality rate of "very nearly six per cent." in 1213 cases, while Weir and Dennis have reported series of 125 and 33 cases, respectively, without death. For so small a mortality it seems hardly necessary to offer explanations, but it is worthy of note that all the patients were of the hospital class, that the two dying of erysipelas undoubtedly were infected in the hospital, and that the case of acute sepsis owed its existence to a streptococcus invasion from an undiscovered source. Curtis's statistics go back as far as 1870. The mortality of the later reporters is much less than that of the earlier, and in view of several series without any mortality I think it may be averred that the complete operation is attended with but little more risk than the incomplete, and that in persons otherwise healthy and in operations unattended with accidents, it ought not to be greater than three or four per cent. This is a very slight risk for the patient affected with cancer to take, especially in view of the prospect of cure.

In order to determine the proportion of cures, we can utilize of the 108 only those cases which were operated on prior to 1891. Deducting these, since that date there have been 30 operations, and the three which have been lost sight of, I have 75 cases. Of these 75 cases,

3 died from the operation,
50 died from recurrence or metastasis,
2 are still living with recurrence,
20 cured. { 4 died of other diseases after having passed the "three year limit" without manifestation of cancerous disease.
16 are alive and in good health on Jan. 1, 1894.

This gives 20 cured cases out a total of 75, or 26.6 per cent. This is a higher proportion of cures than has been previously reported. Curtis gives 20.7 as the percentage of cures in the 1213 cases he collected; Weir "nearly

twenty," and Dennis 25 per cent. The value of my percentage is increased, I think, by the fact already mentioned, that but three cases of 108 have been lost sight of.

Regarding these 20 cured cases more in detail, let me say of the four who died of other diseases after passing the "three year limit" that

One died at the end of 5 years of pneumonia.
One " " " " " $3\frac{1}{2}$ " " chronic bronchitis and emphysema.
One died at the end $3\frac{2}{3}$ years of acute rheumatism.
One " " " " 3 " " chronic nephritis.

The sixteen (16) cases still alive and free from recurrence have lived on an average six years and a few days, since the operation.

To be more explicit:

Two are living and well three years and nine months after operation.
Four are living between 4 and 5 years after operation.
Three are " " 5 and 6 " " "
One is " " 6 and 7 " " "
Three are " " 7 and 8 " " "
One is " " 8 and 9 " " "
One is " " 9 and 10 " " "
One is " 10 years after operation.

These cured cases are all the more significant because of the extent of time they have remained cured, the average six years, being twice as long as the three year limit. Only two have undergone secondary operations. Of the four who died free, one had a recurrent nodule removed at the end of four months, and died of rheumatism over three years later. Of the sixteen still living, one had three nodules removed at periods of six months, seven months and eighteen months after the primary operation, and is living $5\frac{1}{2}$ years since the last operation.

In computing the percentage of cases, I have included in the total of 75 the three patients dying from the operation. This class has been deducted by some reporters. I have excluded from the "cured" list one case which died of cancer of the œsophagus nine years after the operation on the breast and axilla, having been free meanwhile from recurrence—a case which might be fairly regarded as an instance of fresh infection, or the development of a growth entirely independent of the original disease. Poulsen * has reported an instance of cancer of the pylorus developing five years after an operation on the breast, which is capable of a similar explanation. I have accepted the "three year limit" as evidence of cure in order to make my statistics to conform to those of others. It seems to be true in the majority of cases that recurrence takes place *in loco*, and metastatic deposits occur within this time, though instances of a later development of both features are not rare. Curtis, from various sources, records 34 recurrences after three years and up to the seventh year. Weir has seen one at sixteen, and one at twenty years. I am not able to give the precise data of recurrence in many cases, but can say that the average duration of life in cases dying of recurrence or metastasis was *less* than three years, and that I have observed no instances of reappearance of the disease after three years. A four year limit would be undoubtedly more accurate. Judged by this standard my list of cures would be reduced by only five cases, making 15 cures in 75 cases, or a percentage of 20 — the same that Curtis's 1213 cases give with the three-year limit.

The patients operated on since 1891, not available for the question of cure, are 30 in number, of whom 10, or $33\frac{1}{3}$ per cent., are without recurrence and with prospect of cure, though an average of but 15 months has elapsed since their operations. Two died within 18 months from

* Arch. für Klin. Chir. 43, p. 592.

the time of operation, free from cancerous disease, one died from the operation, which is already counted in the list of deaths, eleven have died of cancer already, and six are living with recurrent disease.

The record of the incomplete operations emphasizes the advantage of the complete or radical method of treatment. Of ten patients in whom only the breast was removed, all died of cancer at the end of an average of 34½ months, three having undergone several secondary operations. It is my conviction that, except as a palliative method, this form of operation should no longer be countenanced. It is unquestionably attended with less risk, as numerous statistics have shown, but our knowledge of the course of the cancerous diseases, and the absence of statistical facts to support it, demonstrate that it is an utterly inadequate method.

In every case of cancer, whether the glands of the axilla be felt to be enlarged or not, the complete operation should be done. It removes not only the diseased area, but the parts more likely to be affected by recurrence, the skin and pectoral fascia, which have been shown by Heidenhain to be often the seat of deposits which may escape the naked eye. It clears out the axilla, the next resting place of the neoplasm, whose glands may be enlarged from disease, without their presence being discovered by external examination. Only in abnormally thin subjects can one be reasonably sure of the condition of the glands, as many surgeons have testified. It should do more than this, and that is, remove the parts between the axilla and the breast, the region through which the lymphatics pass. In my operations I have been in the habit of removing the parts in one solid mass from the inner periphery of the breast to the apex of the axilla; and this detail, which is not generally insisted on, I regard as of great importance.

Without quoting other statistics, it may be safely stated that the complete operation has been, since its introduction,

attended with a diminishing mortality and an increasing percentage of cures. It has unquestionably been done in many cases in which it could promise little on account of the extent of the disease. One cannot avoid this conviction in reading the histories of individual patients, and I know that in many hospital and some private patients I have performed operations under circumstances which a maturer judgment, and larger experience, would now regard as contra-indications to the operation. If we could expunge from all our lists the number of these advanced cases, the showing would be a very much more encouraging one. My notes are not sufficiently full in the matter of extent of the disease to enable one to make any such distinction. Such points as adhesion to the wall of the chest, involvement of the pectoral muscle, fusion of the cancerous glands and adhesion to the axillary vessels are rarely mentioned, though all or some of these conditions have been met with in a considerable number of cases. But in regard to involvement of the axillary glands I can give some data :—

Of the twenty cured cases the breast alone was affected in twelve, while in eight both glands and breast were involved. Of fifty-five cases dying, (3) of the operation, of recurrence (50), or living with recurrence (2), the glands were involved as well as the breast in thirty-eight, while in ten the glands were free from disease. In seven the condition is not stated. In other words, of the cured cases forty per cent. had both breast and axilla affected. It should be stated that the evidence of involvement of the glands in most cases was determined by microscopic examination, and that in many the deposits in this region were detected only after the axillary fat was cut into.

The complete operation then is capable of effecting cure even when the glands are involved, and that in a considerable proportion of cases, and if we make a sharp distinction between the cases according to the condition of the glands,

we shall get the following more encouraging picture of the seventy-five cases:

This condition was not noted in	7
Breast alone affected in	22
Breast and glands affected in	46
	75

Of 22 cases in which the breast alone was diseased, 12 or about 54 per cent. were cured, 10 or 45 per cent. died of recurrence. Of 46 cases in which both breast and glands were involved, 8 or 17 per cent. were cured, and 38, 82 per cent., died of operation, or a recurrence, or are living with recurrence. This showing would support the statement that in at least one-half the cases of cancer limited to the breast alone the complete method may be expected to effect a cure. The deaths, it is to be noted, all are among the cases where both glands and breast are involved. Delaying the operative treatment, then, not only increases the death rate but diminishes the prospect of cure. Patients ought to be subjected to the complete operation in the earliest stages of the disease. There is no longer any excuse for delay on the part of physicians on the ground that more time is needed to make a diagnosis, and the laity, if made aware of the possibilities of cure, will promptly overcome the dread of operative treatment, which is another reason for delay. Irregular practitioners furnish the public with the strongest representations, or misrepresentations, of the success of other methods which we know to be of less value than the operative ones. Why should not the regular profession, through its public representatives, the Boards of Health, be equally active in informing the people of the danger of delay, and the promise of cure by early and radical treatment?

In a condition, the successful treatment of which depends absolutely on its promptness, exactness in diagnosis

should play a secondary role. A lump in the breast is never a "nothing," as it seems occasionally to be termed by physicians who see it first. It is either an inflammatory deposit, a solid or cystic tumor. Between the two latter conditions it is often impossible to distinguish in large and even small breasts. But the hypodermic syringe and needle, which should be used in all doubtful cases, clears up this point at once. With its use I have demonstrated the harmlessness of cases which have been viewed with suspicion or pronounced malignant by others, and in passing may note that I have encountered thirty cases of simple cysts of the mamma in the past ten years, probably about 10 per cent. of all the cases seen. If a tumor be thus proved to be solid, exploratory incision should be made the diagnostic test, when its features are doubtful. Naked eye inspection will usually suffice, though the freezing microtome and the nitric acid test of Stiles, or the "punch" devised by Mixter, are unobjectionable. They can be employed when the incision is not allowed. There is no reasonable objection to the incision. A benign growth demands operation almost as urgently as a malignant one, for we have ample testimony of the degeneration of these tumors into malignant ones at or after the menopause. Inflammatory deposits can suffer no harm from incision or removal. They are liable to be the precursors of cancerous disease, and can be looked upon as safe and entitled to be unmolested only when they are disappearing spontaneously after a recent acute mastitis. I have two cases bearing on the degeneration of benign tumors which are worth recording. The first, a woman of forty-five, noticed a rapid growth of a tumor which had been quiescent in one breast for sixteen years. At the end of one year the whole breast was transformed into a typical carcinoma, which was removed without the glands. Two secondary operations were done, followed by local recurrence, and she died at the end

of five years from the beginning of the disease, with cancer of the liver. The second, aged seventy-five, carried for eighteen years a small, painless tumor, which in one year involved the greater part of the breast and the axillary glands. One complete and one secondary operation were followed by death from cancer of the lungs and pleura, after twenty months.

A condition of chronic eczema of the nipple (or Paget's disease) giving rise to cancer I have met with in four cases, which are noticeable because the duration of the ulceration did not exceed one year—being four months in one, eleven months in a second, and about a year in the third or fourth. In two the glands, as well as the breast tumor underlying the ulcer, were cancerous. The ages were forty-eight, sixty, fifty and forty years. One patient, operated a year ago, is still alive and free. Two died of recurrence within two and one half years. One lived eighteen months free from trouble to die of pneumonia. One patient declined any investigation of the axilla, and was obliged to undergo a secondary operation eight months later, which revealed glands which must have been diseased at the time of the primary and incomplete operation. The importance of these cases should not be overlooked. Although it has been noted that these eczematous conditions often go seven and even ten years before the development of cancer, it is proper to regard them with suspicion, and desirable to treat them promptly by complete operation so soon as milder measures fail.

In one of the above cases, where an ulcer had existed, refusing to remain healed under the application of ointments for a period of eleven months, I had a "wedge" of the base of the ulcer removed for examination by the pathologist, who pronounced it only "chronic inflammation." In view of the duration of the ulceration and its well-known tendencies, I urged exploratory incision. A part of the

ulcer, deeper than the mass removed, looked surely cancerous. The whole breast was removed and the axilla invaded. Subsequent investigation showed the breast to be cancerous in the neighborhood of the ulcer, and the glands not to be affected. These might be considered cases of primary epithelioma of the nipple, but the fact remains the same that a persistent ulceration of the nipple often leads to cancer, and must not be neglected.

It has been generally claimed that the complete and even the incomplete operation, when it fails to cure, prolongs life and makes its ending less distressing. I have not the data at hand to give figures bearing on these points, because the duration of the disease, as proven by patients, is so indefinite; but I can safely say that, judging by the results, so far as the duration of life is concerned in those which have undergone secondary operations and those which have not, the operated cases have the advantage. For instance, of ten incomplete operations all died of cancer at the end of an average period of $34\frac{1}{2}$ months; seven of these without secondary operation lived on an average of $23\frac{6}{7}$ months; three who had secondary operations lived an average of $58\frac{1}{3}$ months after the first operation. Of sixty patients with complete operations, I note forty-seven who died without any but the first operative interference $20\frac{34}{100}$ months, while thirteen, who had one or several operations subsequent to the first, died thirty months afterwards. But one single case is worthy of mention:—a woman of fifty underwent the complete operation for a tumor of the breast alone of two years' duration. She died of cancer of the liver, lungs and pleura, at the end of eight years and eight months after the operation, ten years and over from the outset of the disease. In this interval five operations were performed, including one on the opposite breast.

Operations, in my opinion, do prolong life, and I am quite sure they have a further advantage in regulating the

course of the disease so as to make it more bearable. In a certain number of cases there is no external outbreak, and the patient dies of internal deposits without knowing the nature of her malady. The annoyance of a foul and bleeding ulcer is avoided, with the pain that comes from involvement of the walls of the chest. Furthermore, the clean removal of the axilla diminishes the chance of interference with the venous circulation and the occurrence of that distressing feature—œdema of the entire arm.

These facts encourage me to advise secondary operations when the growths are small and freely movable. Several such operations may be required without materially diminishing the prospect of final cure; but in general, I have little faith in the value of secondary operations, except as palliative measures. I believe it is an excellent measure, in dealing with the first recurrence, to give an anæsthetic and inspect thoroughly the whole line of the cicatrix; rather than to trust to the removal of the growth with the use of cocaine. This "revision of the scar," as I have termed it, done at the moment of the first recurrence, has enabled me to find and remove nodules that were not felt on palpation. The cocaine operations, of which I have done a number, have seemed to me exceedingly unsatisfactory.

In the axilla the removal of recurrent nodules or glands is often a matter of difficulty, owing to the presence of cicatricial tissue and the likelihood of finding deeper masses adherent to the axillary vein. Excision of a portion of the vein is required in the latter event, a procedure which I have never known to give rise to unpleasant results, but which may in its performance offer an opportunity of wounding the vein several times unawares, with serious hemorrhage. In general, operations for recurrent masses, which are adherent either in the axillary or breast part of the scar, I have found to be of no advantage whatsoever.

The operation itself needs no description in detail, but

there are several points which are worthy of emphasis. The skin incision should in general conform to the oval type—a widely open oval—and extend from a point near the sternum to one overlying the axillary vessels. Its long axis may be at right angles to the direction of the pectoral fibres, with a second cut in the axillary region, if the tumor be most conspicuous at the upper and inner or outer and lower periphery. Its outline is of little consequence. Its distance from the neoplasm is of the greatest importance. When the growth is in the breast I have usually placed the incision at least one inch from the borders of the gland, where it is peripherally situated two inches from the edge on the side affected. The cut must be made without reference to subsequent approximation of the edges, though much tissue can be advantageously saved in the axillary part of the incision, and in the majority of my cases a primary union has been possible. After separating the mamma itself it is allowed to hang down, still in connection with the axillary part, till the parts between the breast and axilla, and the contents of the latter, have been separated. There is little danger of wounding the axillary vessels if the fascia over the vein is first clearly laid bare, and the mass of vessels and nerves gently pushed away from the fatty contents, the vessels crossing the space being clamped before they are cut. The sub-scapular nerves must be avoided, but the intercosto-humeral branches must not be cut. After the axillary space has been freed of its contents, search must be made at the very apex, and in the region between the two pectoral muscles where outlying glands are occasionally found. In closing the wound I have given up all sorts of relaxation sutures and come to rely on fine catgut. The edges are brought only loosely together without any strain, but carefully approximated to the deeper parts with compresses supported by adhesive straps. The axillary space must be obliterated by an additional wad of

gauze. If open wounds are left, it is better, in my opinion, to practise skin-grafting after granulation has occurred. The operations have naturally, in the course of these years, run through the various modifications of antiseptic dressings. The most recent cases show the most satisfactory results, and these have been done on aseptic principles, with sterilized materials, and without irrigation or drainage. Complete primary union, without complication, has been obtained in fully two-thirds of the cases, and, where it has failed, there has been no serious sequela nor prolonged suppuration. In two instances erysipelas was fatal. Operations done in private houses have produced uniformly good results as regards wound healing. There have been no serious after effects of these operations. Some patients are much annoyed by a hyperæsthesia of the skin on the inner side of the arm, which gives place to numbness which gradually disappears. This phenomenon has been such a frequent source of complaint when the dressings are removed, that I usually lead patients to expect it, and promise that it will disappear.

The movements of the arm and shoulder joint have become ultimately perfect in all cases. I usually encourage motions from the elbow on the fifth day, and those of the shoulder after the tenth day, and on the average the slight stiffness yields to natural exercise within three or four weeks.

In closing let me say that I have made no distinction in this series between the different varieties of carcinoma, because of the difficulty of assigning many cases to an individual class. But I should state that I have uniformly advised against operation in the variety known as "atrophying scirrhus" occurring in old people, and in the rapidly growing voluminous tumors occurring between thirty-five and forty-five, and described as encephaloid or medullary carcinoma.

I thank the Massachusetts Medical Society and yourself, Mr. Chairman, for the privilege of bringing before you these results of treatment of this most important surgical disease; and I hope that your experience may be in line with my own, and will serve to strengthen our convictions that the modern radical or complete operation has already cured from twenty to twenty-five per cent. of all cases of cancer of the breast; that it may be expected to cure at least one-half the cases if applied before the axilla is invaded; and that it is likely to have an even better showing if the patients can be brought to treatment earlier than they manage at present. This can be effected by less attention to accurate diagnosis, and by giving up the habit of waiting to see how the tumor will develop, and by relying on needle exploration and incision. The incomplete operation should be abandoned, except as a preventive measure, or for the relief of local symptoms. Benign neoplasm and inflammatory deposits should be removed, and persistent ulceration of the nipple treated as cancer. Secondary operations are of value only when the nodules are small and free from adhesions; and the "revision of the scar" should be performed in the event of the first recurrence after complete operation. The risk of the complete operation is slight, and it is followed by no undesirable after effects.

DISCUSSION.

Dr. D. W. Cheever, of Boston.—I wish to reiterate what our Chairman has said in thanking Dr. Bull for his interesting paper.

In anticipation of his coming I made quite an effort to get some statistics of my own cases, which might be reliable, and on which I could base some accurate statements. I regret to say that I have failed wholly, owing to not

having looked after them very soon after operation, and their being lost sight of; so that, although I have done a good many operations, I must rely upon my memory for the general facts; therefore what I shall say will have less permanent value than it would otherwise have.

My own experience goes back to the time before antisepsis; and one point I would make with regard to the old operation on the breast is, that even before antiseptic dressings it was a very safe operation,—by this I mean simple removal of the breast itself. I am quite confident I have never lost but one patient by simple excision of the breast; and in former times I have sometimes operated in the country where the ligatures left in failed to suppurate, and had to be dragged out through healthy granulations, without the formation of pus. But since the antiseptic method came in we have had immense advantages; and for the simpler form of excision of the breast I think we can claim now that it is absolutely painless. I remember a lady saying to me, on leaving the hospital, that she had had no pain; no pain of course under the ether, and no pain in the healing, because it took place by first intention.

With regard to the later operation for removing large portions of the axillary tract, I have not had so much experience. I must differ from the gentleman who has spoken in his belief, if he wishes to be so understood, that all the infected material can be got at and removed by any operation in the axillary space. We are familiar with the fact when we are obliged to follow high up any glands, that there will always be on the subclavian vein little suspicious points, if suspicious points have been found below. I do not believe we can accurately estimate how far the disease has gone. Of course, if statistics and large experience prove, that removing all we can remove with safety to the life of the patient, will give a greater percentage of long-continued improvement, or recovery, than any other operation, we should do it; but I can but regard any operation for cancer as essentially incomplete. I do not believe there is such a thing as a completed operation when the disease may have invaded minute and distant portions of the lymphatic system.

As to the duration of life, setting a three-year limit after the operation is not nearly enough to premise, or promise

a cure. Three years is not long enough. I was very much struck with a case of my own, some years ago, in which the wife of a medical man was put under my care the moment a small nodule was suspected in the breast; the breast and nodule were removed after the older and simpler method. This patient went on in perfect health until between four and five years, and in the fifth year developed cancer in the liver, without recurrence in the breast itself. We know that many cases of cancer of the breast live a good while even if not operated on, especially the shrinking and atrophic forms.

The natural history of cancer of the breast I have seen well-illustrated a number of times when it was not operated on; and from my own experience I should set the natural period of life in this disease at certainly over four years, from four to four and a half years. Such being the case, then, we ought not I think to base any claim of cure on less than a period of exemption of five or six years. We could hardly say we had prolonged life unless the patient lived that time.

I am glad to notice two things: one is that Dr. Bull is able to tell us that in New York operations of this very grave character do as well in private houses as they do in hospitals. That is a very strong point, because the antisepsis of the private house never can be so perfect as in a hospital. I had much rather operate, or have a friend operated on, in a hospital than in a private house, because I consider the numerous details so essential for success and healing are carried on in the hospital by a long series of disciplinary rules which have been enforced on the immediate attendants and upon the sick person. It used to be said: "If you have a home, don't go to the hospital." Now I should say: "Go to the hospital in preference to your home, if you are going to have a large cutting operation."

The other point is the fact that he is reducing so much the mortality from the immediate operation of what is called complete excision of the breast, axilla, pectoral muscle, etc. So far as I had seen formerly the mortality had been very much more than it was from simple excision of the breast.

I do not think he has touched upon the point,—perhaps he will pardon me if I ask him to tell us about that in con-

cluding the discussion, as to how much deformity or infirmity or loss of power, or loss of exact use of the arm and shoulder, are left after these extreme mutilations which go so deep into the axillary space. If the use of the arm is good, and if the mortality can be brought down to that of a simple excision, the larger operation may be the preferable one.

But I think we must be in doubt, as yet, whether five, six, or more years ought not to elapse, before we can count upon a perfect cure.

Dr. S. H. Weeks, of Portland, Me.—There is no subject in the entire field of surgery that is so interesting to me as the one under discussion,—carcinoma of the breast; and I am extremely glad that I am here to-day, and consider myself very much honored, Mr. Chairman, in being requested to take part in this discussion.

The two points which were so clearly set forth in the paper are the ones which I think are uppermost in the minds of us all: first, how large a percentage of patients are cured by operation; and second, how much more of time does a patient enjoy or have after operation in those cases not cured by such operation?

I confess that the picture which Dr. Bull has given us is much brighter than that upon which we have been accustomed to look. The percentage of cures according to his experience reaches twenty-six, certainly a much larger percentage than has been my privilege to secure, and much larger than that of most operators according to my observation. I think it is Mr. Butlin who in his excision of the breast for carcinoma says that a cure, that is a freedom from recurrence for fully three years, which I think is the limit set by Dr. Bull, may be expected in 12% to 15%, only about one-half that given by Dr. Bull, and in cases of sarcoma of the breast a much more favorable outlook may be anticipated.

Now, Mr. Chairman, in considering this question as to the percentage of cures, I think we must take into consideration the nature of the growth and the time at which the operation is done, and also something of the etiology.

First, as to the nature of the growth invading the mammary gland, I think it must be the experience of every one that a cure is more likely to result in cases of scirrhus car-

cinoma than in cases of medullary carcinoma. I confess that when I am called upon to remove the breast, the seat of medullary carcinoma, I have almost no hope of effecting a cure, and the cures which result in my opinion are largely in those cases of scirrhus carcinoma. It must be so.

Then again, as to the time at which the operation is made; that has another important bearing upon the percentage of cures. I have no question that the early operation is much more successful in effecting a cure than an operation made at a later date.

As to the etiology. I think the tendency of the profession to-day is, and justly too, to look upon carcinoma as of local origin primarily,—certainly it has an important practical advantage in leading surgeons to operate early, but I cannot rid myself of the conviction that in some cases there is a vital defect deeply grafted in the constitution which is inherited from the parents, and where there is this strong hereditary tendency it acts as a predisposition to recurrence after removal of the growth, and it seems to me in those cases the percentage of cures must be much smaller than under other circumstances.

Now as to the next question, as to how much of additional life is given to our patients by an operation, I was much interested in the paper which has been read, and I was much interested in reading an account of an analysis given by Mr. Williams, of London, reporting a series of cases from the Middlesex Hospital, published in the *Lancet* for January, 1889. The averages which he gives are something as follows: the average duration of life was 60.8 months in those patients that underwent operation, and 44.8 months for those in whom the disease ran its natural course, giving an additional time of sixteen months in favor of operative interference. The average duration of life after excision of the breast was 40.3 months. The average interval between the first operation and the first recurrence was twenty-six months, the maximum being one hundred and thirty months, the minimum two and five-tenths months.

One other thought, Mr. Chairman, occurs to me, and one I think of a good deal of importance, and that is as to the so-called minor and major operations. It has been my practice more especially of late to remove the entire contents of the axilla, in every case where excision of the

breast is called for, including those where no enlargement of the glands can be detected by external manipulation. That has been my practice of late years; formerly it was the minor operation, simply removing the breast Now, sir, while I believe that under the antiseptic precautions of the present day the major operation is comparatively safe as to the life of the individual, yet I believe that there are impairments of function, that there are pains from which our patients suffer, resulting from the major operation which do not follow the minor operation, and this certainly is to be taken into consideration; and I hope Dr. Bull in closing the discussion will call our attention more particularly to this point. I was interested not long ago in reading Mr. Treeves's surgery upon this subject, in which he distinctly says: "formerly I was in the habit of removing the contents of the axilla in all cases where excision of the breast was called for, including those cases where there was no enlargement of the axillary glands, but I now have discontinued this operation, believing as I do from my own experience that the results obtained by the major operation are in no way superior to those obtained by the minor operation." That is Mr. Treeves's experience. Now he states what has been my observation in a few cases that the patient does complain of stiffness of the shoulder, does complain of pains along the course of the nerves of the extremities, and in one case a lady now some two years since the operation is still suffering from œdema of the hand and forearm. I believe this condition was due to the major operation clearing out the axillary glands. Of course every surgeon in removing the breast will open the axilla and examine the glands, and if they are enlarged by inflammatory deposit he will remove them. I think the surgeon in opening the axilla and introducing the finger will be able to detect the large glands, so that I would recommend opening the space and at the same time, in the light of my own experience, after having introduced my finger into the axilla if I found enlarged glands I should remove them; otherwise I am inclined at the present to leave them.

I am very much interested in the paper and glad to hear the experience of men so large as that of Dr. Bull, and his

experience will certainly influence my future practice, but this is my present feeling.

One other point, Mr. Chairman, and I am done. At the meeting of the Surgical Association in Washington, Dr. Bull's assistant read a very interesting paper upon the use of the toxine of erysipelas as a cure for cancer. I was very much interested in the paper, and it does seem to me as if there is some light thrown upon this dark background of malignant disease, and I should be glad if the gentleman who follow me in the discussion, especially Dr. Bull, who has given it a good deal of thought, would tell us his opinion as to the advisableness of using toxine injections after the operation as a prophylactic measure.

Dr. J. C. Warren, of Boston.—In a discussion of this kind, it seems to me the important points to be considered are those bearing upon the question of a permanent cure of the disease, which group themselves into three principal headings: first, the pathology; second, the diagnosis; and third, the treatment. It is perhaps worth while to say something in addition to what has been said about the pathology of the disease. I find there is a very great difference in the different types of cancer of the breast, as I have no doubt the other gentlemen also do. As the surgeon goes on operating on this, that, and the other case, referring the specimen to the pathologist, and watching afterwards anxiously the result, he finds that the different types of the disease settle themselves not only pathologically, but clinically, into three or four distinct types. The most malignant of all is the medullary cancer, and for convenience we may designate the other as the scirrhus type, the difference between the two depending, as you know, largely on the amount of cell structure in the two varieties. If, after operation, the pathologist gives the diagnosis scirrhus, I think we have a right to say to the friends of the patient that the gloomy prognostications of all those who have been concerned up to that point in the case are to be somewhat modified, that we have a certain ray of hope in the future, because, according to my experience, the prognosis of scirrhus is certainly more favorable than that of the medullary cancer. In fact, I may say that nearly all, if not all, the cases that I am cognizant

of to-day that are cured by operation are cases of scirrhus cancer.

There are two other types, however, that are less malignant than scirrhus. The types which I refer to are the colloid cancer and that which is sometimes called the atrophying scirrhus. There is a tendency not to recognize the atrophying scirrhus as a separate type, but clinically I think we must acknowledge it as a distinct type,—a type where there is little or no disease at any one time. As fast as the cancerous material occurs it is absorbed and the cicatricial tissues takes its place, and therefore, even after many months or a year or two of growth, we have nothing but a scar-like structure which seems to have shrunk and to have absorbed a great deal of the normal tissue around it. I have seen in elderly people, the period of life when it is most frequently found, several such cases, and remember personally now one case where a patient refused to have anything done, in fact never spoke to me about it although I was her physician a great many years. I accidentally discovered it while I was ausculting her for a slight trouble, and was present at her autopsy some ten years later, when malignant growths were found in the internal organs. The duration of the disease must have been twenty years.

Then there is the colloid type, proverbially slow. Unfortunately that is not a very common type of the disease. I have seen but one or two cases of typical colloid cancer of the breast, and in one of the cases the patient is alive to-day, ten years after the operation. Ten years ago I did the old fashioned operation, that is, removal of the breast alone, as I did not feel any glands in the axilla at the time; and I think this case points a moral, because there never has been any return in the breast, but about five years after the operation a gland grew in the axilla and was removed by me; and that shows me certainly that in every case, even in the less malignant types of the disease, we certainly ought to lay open the axilla. Dr. Bull's remarks about the non-malignant growths interested me. It has been my experience to have a great many ladies come to me in great distress with a tumor in the breast, at a period of life when we are likely to find cancer, forty-five to fifty-five years of age, or between forty and fifty. A number of these cases prove to be cysts of the breasts, and they

are very hard to diagnosticate by palpation. There does not seem to be any fluctuation. They seem like solid growths. In some of the non-malignant growths of the breast we ought to remember that we have a change to malignant types. I do not mean the class of cases I have just referred to as occurring late in life, but to growths seen between twenty and thirty or thirty to forty years of age, the chronic mammary tumors as they used to be called. A year ago I had a case in point. The patient was a lady about fifty years of age who had had for over twenty years a small chronic mammary tumor. Within a year it had begun to increase in size and develop a very malignant type of growth. At the operation a cancer could be seen distinctly developing from the chronic mammary tumor.

Although it seems as if the specialist ought to be able to make the diagnosis of cancer of the breast in every case, in certain cases it is undoubtedly very difficult to decide whether there is malignant disease or not, and some years ago I advocated a method of exploration which was based upon an instrument devised by one of the teachers in the Harvard Medical School, Dr. Mixter. A little punch was employed by him for extracting grains of powder from the skin. At the time I brought this question forward I had been much impressed by a case brought to me by a physician in which the tumor had existed about four weeks. The patient had hit her breast against an object of some kind on the wall and had a black and blue spot; a swelling had occurred, which had diminished somewhat at the time of her visit. I advised her to wait. The growth was in an unusual place and was growing smaller. Instead of coming back in one month she came back in two months. There was then a malignant disease involving the whole breast, making operation impossible. It seemed to me, at that time, that some method should be devised by which we could establish a diagnosis at once in doubtful cases. We ought to be able to give the family physician the diagnosis which he comes for. I gradually increased the size of the punch. A solid cylinder of the diseased mammary tissue could be bored out, and as elaborate a diagnosis could be arrived at as can be made by the pathologist if he has the whole breast lying on the table before him. Within a week I saw a patient very much dis-

turbed because a friend of hers had been operated on for cancer, and she had a nodular growth in the breast. I said to her: "I do not think it is malignant disease. I think it is a chronic mastitis with some lobular enlargement, but I am not perfectly certain. If you wish I can put the nature of this growth beyond doubt by making this little puncture." I thus drew out fluid, and removed a portion of the cyst, the walls of which showed evidence of glandular structure, and have been able to relieve her mind of an agonizing doubt. About a year and a half ago a very intelligent lady came to me who had been told, when she was a young woman, by her doctor, that when she arrived at certain age she must look out for cancer. There was a history of cancer in her family. She had been impressed with that knowledge which Dr. Bull thinks so important people should appreciate. She was able to make the diagnosis of the presence of a lump in her breast three or four days after it first appeared, and I believe her statement to be correct. She had felt on Friday over the breast and had not found anything; on the following Tuesday she discovered a lump about as big as the end of my little finger. In two weeks it was brought to my attention. It was rather an unusual seat for cancer, the inner and upper quadrant of the breast, and I did not like to advise operation unless an examination had been made, and so I advised exploration with the punch. The specimen was sent to Dr. Whitney, and both he and Dr. Councilman pronounced it cancer. Within three weeks after the first nodule had appeared the operation was performed, and the completed operation was done as I do in all cases; and here is, I think, an extremely interesting and instructive point: the breast and the axillary contents were sent to Dr. Whitney, and it was found not only to be malignant at the point at which we made the puncture, but that another nodule was found in another portion of the breast, and a gland about one half the size of a pea was already forming in the axillary fat. It shows, therefore, the importance of doing an early and completed operation.

Dr. J. B. Wheeler, of Burlington, Vt.—Mr. President and gentlemen of the Massachusetts Medical Society: I wish to thank you for the honor you have done me in

inviting me to participate in the discussion of such an important subject. The experience of a man who practises in a town of 15,000 inhabitants, situated in a sparsely settled district, of course is small in comparison with the experiences of those who practise in the large centres. But such as that experience has been, and from the observations I have been able to make of the work of others, and from what I have been able to read on the subject, I am most heartily in accord with the views Dr. Bull has expressed in his paper as to the advisability of the modern thorough operation, and of doing it at the earliest possible moment. I have not much to contribute to this discussion beyond the personal experience I have alluded to, which I will give and which you can take for what you think it is worth. It consists of thirty cases, and I am sorry to say that in only a few of them have I been able to verify the diagnosis by microscopic examination. That of course renders the work of comparatively little value as regards the question of recurrence, but it has perhaps more bearing on another point, and that is the danger of the operation. Twenty-five of these operations were the complete operation in which the breast, pectoral fascia and axillary glands were removed as far as I could get up under the clavicle. Five of the operations were incomplete. About half were done at the Mary Fletcher Hospital, and the other half in small villages scattered over the states of Vermont and northern New York. The mortality rate was nothing. Ten of these operations were done five years ago or over, and three of the cases operated on five years ago, or over, have not recurred. Now in view of the fact that the list of thirty cases with a mortality of nothing includes so large a proportion of the radical operation, and in view of the fact that in the other lists which have been reported the mortality is so small, it seems to me that the matter of comparative danger between the radical and partial operation, is not one that is very much to be considered in comparison with the question whether we can prevent or delay recurrence after the operation. Now statistics of large numbers, as Dr. Bull has shown, seem to show a difference in favor of the radical operation both as regards prevention and delay of recurrence.

It is true, as has been said, we cannot expect to eradicate,

cannot be sure we have eradicated everything in operating on any case of cancer. But, on the other hand, although we cannot be sure, if we do all we can, that we have eradicated enough to prevent recurrence of the disease, statistics show that we do eradicate it wholly in a certain percentage of cases, and in others delay recurrence longer than by the old operation. It is the same as in operating for tuberculous disease, if we remove everything we can find and more too, we are not as likely to get recurrence, and not as likely to get it as soon, as if we are less careful to remove everything. Why should we hesitate to do the most radical operation in our power when the chance is given us?

With regard to the matter of which Dr. Weeks spoke, erysipelas toxine, I should like to mention one case which came under my observation, although I have had no experience with the use of the toxine itself. It was a case operated on by Dr. Henry J. Bigelow when I was house officer in his service in the Massachussetts General Hospital, in 1878-79. The patient had a tumor tolerably well circumscribed in the right breast. She was a lady about fifty, who was reluctant to have anything more done than the mere removal of the tumor itself. The whole breast even was not removed. She had a very severe attack of erysipelas in the wound, which had been sewed up; it gaped, suppurated, and there was pretty extensive sloughing so that the erysipelas made the operation much more complete than the knife had done. The wound finally healed, and she had no recurrence for ten years. At the end of that time the glands began to enlarge in the axilla, and two years later she came to me to have them removed. The axilla was filled at that time with an enormous mass, and it was only because she had become anxious for an operation that I undertook to do anything so extensive. It required a very severe dissection. The glands were adherent to the axillary vessels, and the axillary vein was opened in the course of the operation. She had a long convalescence, but finally recovered. But the growth recurred in about sixteen months, and she died about a year later. I have mentioned this case because I thought it might have some bearing on the question of erysipelas toxine, and if Dr. Bull thinks it worth while when he closes the discussion I should be glad to know what he thinks about it.

Dr. G. W. Gay, of Boston.—In discussing this subject of the curability of carcinoma of the breast, I feel very much as I did when Koch's method of curing consumption was given to the public, and I am inclined to make the same criticism, if criticism it be, at this time, that I did then; namely, it is too good to be true. It will be a happy day, indeed, when we can cure two of the most fatal diseases in our midst.

I wish with all my heart, Mr. Chairman, that I had some testimony to offer in support of the theory, that it is ever possible to remove a cancer of the breast early enough, or thoroughly enough, to effect a permanent cure. I have no such testimony in my possession.

In an experience extending over twenty-five years in the City Hospital, and also in a private practice of fair proportions, including about one hundred operations, I have seen but one case of tumor of the breast which was pronounced malignant by the pathologist, in which the disease did not recur. That being a solitary instance, I have taken the liberty to doubt the diagnosis.

It is undoubtedly true, that many cases were not seen early enough, and that in many instances the operation was not done thoroughly enough to eradicate all of the disease, even if such a thing were possible. Of late years the last criticism cannot be entertained as formerly, for in several instances the operation was most thorough and extensive.

The question, as I understand it, is this: Is there ever a time in the career of carcinoma of the breast, when it is purely a local disease, and hence capable of being permanently cured by an operation, as is a fatty or other benign tumor? If there is such a period, it has not yet been demonstrated to the satisfaction of a majority of physicians.

Every practitioner of many years' experience undoubtedly knows of a few scattering cases of what was supposed to be cancer of the breast, in which no recurrence followed a removal. But there was nothing peculiar about the operation or treatment to account for the immunity, which was undoubtedly due to the character of the affection rather than to the method of treatment.

Dr. Dennis read an interesting paper before the American Surgical Association three or four years ago, in which he

took strong grounds in favor of the curability of cancer of the breast by early and radical removal. He reported thirty-three cases of undoubted carcinoma of this organ, the diagnosis being confirmed by the pathologist, which had remained well at the end of three years, and therefore, in his opinion, was to be classed as permanent cures. He prophesies, that with early and radical operations the recurrence of this disease after removal will be, comparatively speaking, a rare event.

I do not see any good reason for saying that a patient is permanently cured, because the disease does not return inside of three years. Why should that particular period of time constitute a permanency? While a respite from the affection for three years is in many instances very satisfactory, I should not consider any time limit, short of death from another cause, to be a permanent cure of the disease in question.

A tumor of the breast involving the skin and lymphatics, and free from the ordinary signs of inflammatory affections, is usually malignant in its character. That such a tumor can be removed radically enough to prevent a recurrence has not been proved to the satisfaction of most operators. It may be possible to extend the incisions, so as to include all of the infected skin. That the dissection can be carried beyond all of the infected lymphatics does not seem feasible. Every operator has traced these infiltrated glands from the axilla up under the clavicle, and even into the neck, and has then been obliged to desist for anatomical reasons, although satisfied in his own mind that he had not reached the end of the trouble.

I submit, therefore, that this class of cases is incurable by operation for the reasons stated.

We now come to those cases of malignant disease of the breast in which the diagnosis is not always clear. I refer to the small, movable tumors of short duration, in which the nipple, skin, and lymphatics, although probably affected, yet do not manifest it by any gross or external signs. Of course it is only in the very earliest stages that these features are present. These are the cases which promise the best results from radical treatment. It is comparatively seldom that malignant affections of the breast are brought to the surgeon's notice during this early stage of the disease. Too

often the patient is advised to let the tumor alone, unless it grows. I presume most of us have been guilty of this mistake. The golden opportunity is thus lost, for it goes without saying, that other things being equal, the earlier the disease is removed, the better are the prospects of amelioration and cure.

A young married woman, recently confined, had a small, movable, painless tumor, the size of a filbert in the right breast. The skin, nipple and glands were apparently free from disease. The tumor presented more of the features of a benign than of a malignant affection, and I unwisely advised delay. Three months later, the indications of a malignant character of the affection were unmistakable. An operation was performed, but she lived less than a year after it. In view of the strong malignant tendency developed in this case, it is more than doubtful if an earlier operation would have made any material difference in the result. The fact remains, however, that the advice first given was not judicious; that the breast should have been removed at once, thus giving her every possible chance for the prolongation of life.

Early operations are, however, at times anything but satisfactory. I well remember removing the whole breast for a small tumor having none of the signs or appearances of malignancy, and pronounced benign by the pathologist. The disease returned within a year, and terminated fatally.

Everyone knows the futility of removing the rapidly growing sarcomas of the breast. Time and the thoroughness of the operation seem to have little influence upon the early recurrence, rapid extension, and fatal termination of a majority of these cases. I presume this class of tumors does not properly come under our discussion to-day, although they are surely malignant enough for all practical purposes, being in many instances much less amenable to treatment than any other form of mammary tumor.

In conclusion I beg to say, that while I have little reason to believe in the curability of cancer of the breast, from my own experience and observation, yet I believe most thoroughly in the effort constantly being made to accomplish this object by surgical measures. I believe that the general rule should be to remove mammary tumors early and thoroughly. Comparatively few of these growths

disappear of themselves, and they are a constant and annoying source of discomfort, mental or physical, or both. An operation for removal relieves the woman of a burden for the time being, and in many instances, in case of a recurrence, the course of the disease is delayed, suffering is diminished, life made more endurable, and the end more peaceful and satisfactory to the patient and to her friends.

Dr. F. H. Gerrish, of Portland, Me.—In accepting the very kind invitation to take part in this discussion I was actuated entirely by selfish motives, desiring to get, in the most pleasant and impressive way, some information in reference to this most lamentable disease; and wishing also to renew old friendships and increase my acquaintance in a medical community, where I have for many years received nothing but courtesy and kindness. I do not imagine that it was expected that I would make any original contribution to this subject. If anybody had such expectation, he is doomed to speedy disappointment. But I suppose that in this, as in many other medical matters, the collective method of investigation has value; and even one who has had only a moderate experience may, by comparing notes with others, do a little something to further the good result in the direction of attainment of truth. I have been very much interested in what has been said to-day. I began my surgery with the old operation of removing merely the breast, unless there was obvious involvement of the axillary glands. I do not agree with Dr. Bull in his statement that his is probably the almost universal method pursued by surgeons. I am of opinion that in some medical schools the old method is taught as the proper one, and I am very sure that there are a great many surgeons, not teachers, who still persist in it, having sanction in their persistence in various text-books in vogue. And yet I am persuaded that the method advocated by Dr. Bull, which I have substantially followed a very considerable number of years, is the only one which should be pursued in such cases. I do not believe any man is so delicate of touch that he is justified in saying that glands in the axilla are not involved in disease simply because he cannot feel them. I have taken especial pains to examine the glands in the axilla, and I recall but one case of quite a number upon which I have operated where I have not found

the glands so involved. I believe that all the adipose tissue in which these glands are imbedded should be removed by the operation. I have not had as good success as Dr. Bull in closing the wound. I make a point, even if only a small portion of the breast has given evidence of malignant disease, of taking the entire gland and every particle of integument over it, always. I distrust every bit of superjacent tissue, however healthy it may look; and the result is that, in many cases, in a very considerable proportion of cases, I am unable to avoid an unsightly chasm. I do use the approximation sutures, and it seems to me that they have done good service. One does not dare leave them in place a great while; but I think that the gap is considerably diminished by their employment.

As regards mortality I have not lost any one of my patients as a result of this radical operation; and, with the antiseptic methods which everybody should pursue, I believe that there is going to be no considerable mortality.

Impairment of function is worthy of consideration. I have no doubt that removing so much tissue as one must in many cases, and injuring the pectoral muscle, as it is injured in removing the fascia covering it, will result in more or less impairment of function, more usually than we get in the less radical operation. But what woman, knowing beforehand that she would have more suffering, and knowing how much more she would have; knowing that the arm would be more or less crippled for a year, or two years,—perhaps that she would never regain entire control of it as before,—what woman would hesitate between that and the almost certainty of greater peril on account of having the less severe operation? I think you would not find a patient who would object. I do not give her a chance. I propose always to do as thorough an operation as I can, knowing that there is an enormous probability that glands entirely out of my reach must escape observation and removal.

It may seem captious, perhaps, to criticise a term so universal as the word "recurrence"; but it seems to me that it does not convey our meaning, if we consider the nature of this disease, as it is now understood. To me the appearance of malignant disease in or near the scar resulting from operation does not mean recurrence in the strict sense of the term. It simply means there has escaped the surgeon's

knife some tissue which was diseased at the previous operation. I wish that somebody would start a crusade against the word, recurrence. I am not sufficiently conspicuous to do it; but some of my metropolitan friends are; and, instead of using this term, which implies that the disease was extirpated, but has from some mysterious agency come back again, they would do a great service by inventing a term expressing what I believe to be the fact,—that the disease has not been eradicated in the operation.

Dr. Bull.—I inadvertently turned over two sheets of my manuscript, and on those were contained some allusions to types of the disease, or to pathological features which Dr. Warren has so properly dwelt upon. I there stated that I had not been able to make a satisfactory distinction between the different classes of carcinoma as it is spoken of by the pathologist, simply because it was difficult when the reports were received to arrange a good many of the cases in the one set or the other; that I recognized that there were certain classes of cancer of the breast which were not fit for operation, and that I had almost uniformly declined to operate on those cases. The classes of cases were, in the first place, the atrophying scirrhus which I think is a very well pronounced type, and I have never had occasion to recommend operation for that sort. Another class is that which occurs in younger women, between the ages of thirty and forty, in the form of rapidly growing cancerous tumors invading the entire breast and forming quite voluminous tumors. That which we term the medullary carcinoma or encephaloid, I think, should not be operated on.

So far as the limit is concerned, I am glad to observe a disposition to criticise the so-called three-year limit. That unquestionably is not long enough; but inasmuch as almost all the statistics which we have to compare our own experience with are on that basis, it seems fair to use that comparison. I think it ought to be five years rather than three. But it is difficult to trace patients, and if we should establish such a limit, and insist upon it, we might fail to get any statistics whatever. I would like to call attention to the fact that in my own cases the four-year limit is insisted upon, and with the five-year limit I should have 20% of cures.

In the last sheet of my manuscript I dwelt on the functions of the arm after the removal of so much tissue from the axilla, and those who have looked at the photographs will observe that all of the women were photographed with the arm over the head, to show that the functions of the arm were satisfactory. In all of the twenty cured patients, sixteen of whom I have seen myself, no interference with the functions of the arm has resulted, and I believe there is no one in the remaining four who have been seen by my assistant. I have not witnessed interference with the functions of the arm either in the way of disturbance of the circulation or stiffness of the shoulder joint in any case. I believe if the early operation is done, and the axilla is cleared out at the time that the glands are small and freely movable, that the operation is not likely to be disabling in any sense whatever. I had called attention to a feature which patients have frequently complained to me about, which may be of some interest; immediately after the dressings are removed, or, as a rule, after the removal of the first dressing, or at the end of ten days or two weeks, they have experienced a considerable degree of hyperæsthesia of the skin on the inner side of the arm, and have complained considerably of it. This has been followed by numbness over the same area. I suppose this is due to division of the costo-humeral nerves which cannot be avoided. Inasmuch as patients have complained so much about it I have found it of advantage to warn them to expect it, and I have been able to assure them that the disagreeable symptoms would entirely disappear. Once a certain interference of function in one of my cases resulted from division of one of the subscapular nerves. It is the only accident that occurred in the whole series of cases. It was the nerve that ran to the supply of the teres minor, I think, or the latissimus dorsi, and led to no more serious discomfort on the part of the individual than inability to get her hand back in order to perform the function of tying the skirts. The function of the muscle was entirely restored in the course of a few months.

The use of the punch which Dr. Warren has alluded to I was not in ignorance of. In fact, I own one of the instruments myself, and I had intended to speak of it. I think it is exceedingly useful for the purposes for which Dr. Warren has employed it, but to my mind it will be

more frequently found advantageous in deciding between two varieties of solid tumor; for instance, where one has to do with a tumor which is sarcomatous or carcinomatous in character, to decide by means of so large an instrument that a tumor is merely a cyst seems to me to be using it a little more than is necessary.

Finally, with reference to the application of the virus of erysipelas in the treatment of cancerous tumors, I must say that I have not discovered any evidence, either in what has been written or has been observed by myself, that offered any prospect of advantage to the patient in bringing about a cure of the disease or a recession of symptoms. In connection with the work which Dr. Cooley has done in New York, and an account of which I think has been given in Boston, more recently in Washington, I have talked with him about a great many of his cases, and without gainsaying anything that he has said, I must say, that as far as the effect of either the actual virus of erysipelas or the toxine upon cancerous growths, it does not seem to have been demonstrated to be of any use, and the good that has been attained in the few cases I have heard of seems to me to be by its acting as a placebo. If one is going to use something for that purpose I think probably pure water would do just as much good. On the other hand, with reference to sarcoma, which does not come within the pale of this discussion, I should like to express the opinion that it has accomplished very satisfactory results, and that I should not only advise, but would submit myself to this treatment for sarcomatous disease.

I thank you, Mr. President, once more, and the gentlemen of the Medical Society, and those who have taken part in the discussion, for the interest that they have manifested in this matter and for their very kind welcome.

ARTICLE XV.

THE ANNUAL DISCOURSE.

THE PHYSICIAN'S EXTRA-PROFESSIONAL DUTIES.

By ALFRED WORCESTER, M.D.
OF WALTHAM.

DELIVERED JUNE 12, 1895.

NOTE.—At an Adjourned Meeting of the Massachusetts Medical Society, held Oct. 3, 1860, it was

Resolved, "That the Massachusetts Medical Society hereby declares that it does not consider itself as having endorsed or censured the opinions in former published Annual Discourses, nor will it hold itself responsible for any opinions or sentiments advanced in any future similar discourses."

Resolved, "That the Committee on Publications be directed to print a statement to that effect at the commencement of each Annual Discourse which may hereafter be published."

THE PHYSICIAN'S EXTRA-PROFESSIONAL DUTIES.

Mr. President and Fellows
of the Massachusetts Medical Society:

On this one day of the year when we leave our patients to the restorative care of Nature, now so beautiful and bountiful, it seems not unfitting that we should ourselves turn from strictly professional themes towards our other interests.

And I am the more inclined to this course by my inability to present any deductions from my own experience in general practice which would be worthy of this occasion. Let us then give this hour to the consideration of our extra-professional duties.

However right it may be under other governments for professional men to devote themselves exclusively to their professions, under our form of government such seclusion is not justifiable. I need not speak of the common duties of citizenship that we share with the laity, for such political duties, however much neglected, can hardly escape recognition.

But I call your attention rather to those duties of citizenship belonging particularly to us as physicians, and yet not sufficiently recognized.

As our civilization becomes more complex the different duties of citizenship become less plain,

but not the less binding. In earlier and simpler stages of social growth these different duties are very plain. Thus, in colonial life, where the common welfare depends upon every man's doing each his part, there can be no question as to the respective public duties of the carpenter, the lawyer and the physician.

In the struggling out-posts of civilization it is not allowable for any one to shirk his share of public work; nor can any waste of power be afforded. Accordingly the carpenter is expected to direct the building of the stockade, and the lawyer must give part of his time to the shaping of the public statutes. Nor can there be any doubt as regards the nature of the physician's public duties. Plainly he must give to the community the benefit of his special knowledge in matters of public hygiene, and he must also take professional care of all who are dependent upon public support.

This, in the present age, means that the physician must give his best advice about the water-supply and about the disposal of sewage and garbage; that he must also give attention to the educational interests of the colony — not only guarding the healthfulness of the school children, but seeing that some of them are being fitted to be his assistants and successors; and even more plainly it means that he must lead the fight against all contagion and infection, and that he must plan a hospital and devote himself to its management.

As the community, which we are now imagining, grows larger, and as many physicians follow

the footsteps of the individual pioneers, these special duties of citizenship do not rest upon all the members of the profession at one and the same time, but may very properly be borne in turn. And further on in the growth of the community these extra-professional duties may be specialized and thus divided among the increasing number of physicians.

Still later in the process of development only a few of the whole number of the physicians may be needed in the public service, and then there naturally results a loss of individual responsibility for any share of the public duties that rest upon the profession as a whole.

But there can never come a time in the advance of a republic when any profession can be released from the obligation of public service. Most especially is this true of our profession.

Nor is it only a public loss when the medical profession fails in giving to the public service its due measure of devotion. For, in the charitable judgment of the people, if physicians do nothing for the State, then presumably it is not from their neglect, but from their general inability and inefficiency outside of their special province. There thus results to the profession as a whole a distinct loss of influence and of usefulness.

How fitting then it is on this occasion, when we meet together for renewed inspiration in our life work, that we should consider these extra-professional duties. Let us at least look them in the face. And let us see in what ways existing con-

ditions might be improved by a larger devotion on the part of physicians to the public service.

Bearing in mind that the physician's public duty comprises those functions of government for which his education and experience have especially fitted him, and which cannot so well be performed by the laity, we find these functions dividing naturally into three classes:

I. The direction of educational processes, so far as the physical welfare of the public scholars is concerned, and also so far as special education is carried into any part of the wide domains of our profession.

II. The care of the physical well being of all, either temporary or permanent wards of the town or State.

III. The legislation and the administration necessary in eliminating all infectious and contagious diseases.

I. The schools of Massachusetts in the past have very justly been the pride of the State. From the earliest days when the feeble Bay Colony gave so freely of its scanty store to the founding of Harvard College "in yon dim unventured wood," no expense has been spared to increase the efficiency of the public schools. And yet, from our point of view, is their present condition what it should be?

Is it creditable at this late day that school children should be promoted from class to class without regard to their physical, but solely according to their mental accomplishments?

After such efforts as have been spent in perfecting the system that produces uniform mediocrity out of natural diversity, is it not high time for more attention to the easier problem of giving fairly well shaped bodies to the boys and girls who so soon will be the men and women upon whom our race depends? At least, is it not time for precautions against the actual damage of the scholars' bodies while their minds are being improved?

Shall tuberculous children continue to be huddled together with the healthy in improperly ventilated school rooms, and shall the regular increase of diphtheria and of scarlet fever, that now comes with each school year, continue to rob the State of her boys and girls? Surely it is possible to prevent the attendance of desquamating children and to separate the tuberculous scholars from the healthy. At least, the school rooms could be kept scrupulously clean; the misnamed "sanitaries" could be made decent; and the dangerous modern custom of giving the old, soiled school books to the new comers could be rescinded.

If the question be asked why such reforms are not at once inaugurated, the answer is easy. The school authorities do not understand the importance of taking such radical steps as would be necessary.

It must be remembered that we are descended, and not so very remotely, from ancestors who were not afraid of dirt. Cleanliness, though long held to be next to godliness, has not been consid-

ered pre-essential. Nor has dirtiness been thought incompatible with finest scholarship. The love of cleanliness is an acquired taste not yet possessed by all of our race. And school teachers who themselves hate dirt, hesitate to interfere with the independence of families who appear to dread bodily cleanliness. And, again, if the teachers should dare to insist upon having clean scholars, they have at hand no facilities for carrying out the reform.

School books are freely given out of the public purse even upon the subjects of physiology and hygiene, but soap and towels and bath tubs are not provided. How can hygienic principles be inculcated where their application is impossible?

Such provision may not as yet be demanded by public opinion; nor is the half of what at present is taught in the schools so demanded. But were the people and their school committees alive to the dangers that lurk in the dirt and in the noisome air of the school rooms, there would soon be a national house cleaning of the schools.

Now, physicians know, as others do not know, that dirt is dangerous, and that foul air is even more to be feared. They also know that many of our endemic infectious diseases are propagated in the public schools. Physicians are therefore in duty bound to work for the remedying of these evils.

Moreover, physicians are especially able to foresee the advantages that would result from greater attention to the physical growth and well-being of

the school children. Surely it need not be that the graduates of one school in this great country will always be distinguished from others by their splendid carriage. Each High School in Massachusetts could give at least this much of a West Point training. Not by the scanty, spiritless teaching of gymnastics, nor by the perverted sports of the present age, but by a reasonable share of the time and attention now given to far less valuable training, the public schools could certainly improve the bodies as well as the minds of our children.

For the inauguration of such a reform physicians are the natural leaders. True, such leadership is likely to carry the physician into local politics, where the scholar is not always welcome, but where least welcome the most needed. After thorough acquaintance with the actual condition of the schools in his district, and with the best conditions elsewhere, it is the physician's duty to persuade the school committee, if possible, of the necessity of improving the hygiene of the schools. This failing, then he must reform the school committee; and this means that he himself must be willing to serve on that committee, caring neither for any threatened unpopularity at the polls nor for any hostile criticism of his best endeavors. His efforts may not at first avail. Much that is disagreeable is likely to be encountered. Public service is generally thankless; and it is to no easy enjoyment that the high duty of citizenship invites us. Nevertheless, the obstacles to reform are not so mountainous as at first they appear. The people,

however much they may indulge in grumbling and in cheap newspaper abuse, are yet not slow to follow good leadership. Parents who at first object to innovations that affect their children and their purses are, nevertheless, quick to recognize real improvements. Moreover, the times are fast ripening for thorough reforms in the public-school system. Parents are learning the dangers of infection. When the school bell rings for their children, they hesitate as never before to let them go. And if the medical profession could be prevailed upon to devote especial attention to the healthfulness of the schools, there would be general rejoicing.

Before leaving this subject we should note the fact that teaching is one of the obligations resting upon all professional men. Galen's famous oath requires every physician to impart his knowledge to the generation following. And although the medical student of to-day has no preceptor, and although the *science* of medicine is so splendidly taught in the great school close by, yet we must not forget the obligation resting upon us to pass on to others, in the measure we have ourselves received, the art of healing.

True, it may nowadays be somewhat awkward for the old physician to find room in the young graduate's head for any hints as to the treatment of patients. But, on the other hand, if our elder brothers, instead of combating the germ theory, would only teach us what they have learned about patients in life-long practice, if they would teach

us what they have learned of comfort's art, then we should be nearer our professional millenium.

It is not, however, only to medical students and to younger physicians that we are under bonds. To the laity we are even more bounden to teach the healing art, so far as we can, to all who are willing to learn it.

We hear nowadays of political campaigns of education directed against financial heresies. Of far greater use would be common sense crusades against the ignorance and superstition that now so flagrantly defy physiological laws.

In earlier times, when everybody knew all about everybody else, the village doctor was also in truest sense a teacher of his art, for then his precepts as to the care of the sick were widely known. Bedside watching was in vogue, and the physician's minute directions were faithfully followed by the kind neighborly nurses, and treasured by them for subsequent use.

Such times are gone by. The art of nursing is no longer a matter of inheritance or of tradition. In place of the neighbors we have nurses now who have devoted their lives to this work. They take the place of the physician's private students, who formerly in return for their instruction gave great assistance. In the same way these modern nurses look to the medical profession for instruction. And every physician, both for his own interest and for his patients', ought to do something towards their training. Even in the smaller towns this great work should be undertaken. Otherwise only

the rich patients can be properly cared for, whereas under the former *régime* the sick poor fared as well as the rich. This is a matter for most serious consideration. The most effective opposition to socialism and anarchy can be made by removing every such injustice. Rank and fortune ought not to flourish where love and charity for the sick neighbor die out.

I beg you to think of this. Call to mind your poorer patients who suffer for nursing which is now entirely beyond their reach. Think also of the many young women who would gladly and gratuitously do this nursing under your instruction, if only you would undertake their training. And then remember that fine old saying, *Noblesse oblige*, or, superior advantages bind to larger liberality.

A very mistaken idea has become current that nurses can be properly taught only in the large hospitals. Of course, it is quite true that nurses *for* hospitals must be trained in hospitals. But for private nurses such training is not by any means sufficient. The new profession of nursing did not originate in large hospitals nor in great cities. And in the original schools, hospital work is still only one of the many departments in which the nurses are trained.

The best nursing service in any community can be secured only by the efforts of the physicians in practice there. In the smallest towns, where as yet a training school is not feasible, great advantages can nevertheless be obtained by the co-oper-

ation of the local physicians with the nearest nurses' school. Such affiliations are happily fast multiplying throughout the State. And even greater blessings will result as physicians more generally recognize their obligations as teachers of nurses.

II. In founding and in carrying on hospitals it would naturally be thought that physicians would be leaders.

Within the last few years, as you well know, there has been a great increase in the number of hospitals in this country. And even in many of the smaller towns hospitals are now being projected. As the greater efficiency and safety of hosital treatment become more widely known, and as the many advantages of cottage hospitals become apparent, Christian charity more and more readily manifests itself in this form. The old time neighborliness and kindness is not lost, but in the hospital has become organized and centralized.

Physicians know best these and other great advantages; they know how rapidly modern surgery advances where hospital facilities exist; they know how effective isolation wards are in fighting epidemics; and they know best the blessings that the hospital affords for the otherwise homeless sick and injured.

And physicians also know best the requirements that must be fulfilled in the erection and in the management of the hospitals best suited for their different localities. Why is it then that the new hospital movement in Massachusetts is not everywhere being guided by the Fellows of this Society?

True, in some places such is the case, but in many other places the hospital movement encounters either the opposition or the apathy of the medical profession. Too often it happens that the physicians whose coöperation is sought, unless given dictatorial power, sulk in their tents. This comes from not being accustomed to public service, or from ignorance of American institutions. Dictators do not flourish here. And the people, who are the rulers, can be persuaded but not driven. If the first physicians are not willing to work with the hospital leaders, then they can meekly work for them or let others do so after the hospital is in running order. This they do in some of our cities. And in natural consequence we find one of the newest hospitals built without an operating room, because, forsooth, the need of it was not suggested to the building committee. In several other hospitals the Fellows of this Society accept appointments on "mixed" or "double" staffs, where the different schools of practice are said to be represented, and where the rules and regulations for their guidance are drawn by lay managers. This they do "for the sake of harmony," and because of their conviction that except for such compliance on their part there would be either no hospitals or only homœopathic hospitals possible in these communities. But do they not thus overlook the fact that this compliance on their part formally recognizes and so perpetuates the false distinctions which we all so devoutly wish to have obliterated?

The roots of this modern difficulty lie buried in the indifference of physicians as regards their extra professional duties. After hospitals have been inaugurated without the encouragement and guidance of those best fitted to guide such undertakings, then it may be necessary to accept the dictation of those who know no reasons why patients at the hospital door should not be asked if they prefer homœopathic or allopathic treatment. But where the Fellows of this Society assume their rightful position in the community, where they show their hearty willingness to do their full share of public work, such awkward predicaments do not arise. In such places there is no necessity for accepting distinctions and designations that ought not to exist, but instead there is grand opportunity for demonstrating that perfect liberality which should be our greatest pride and glory.

Of far more importance, however, than any question of medical ethics is the duty of the physician as a public-spirited citizen to see that proper care is given to those for whose care the community is responsible. Not only in the hospitals, but even more in the asylums and in the almshouses, a constant watchfulness is needed to ensure for the unfortunate the best care that a constantly increasing enlightenment makes due to them. Nor can such oversight be relegated solely to officials, who are indeed the least able to secure even the reforms that they desire. In the almshouse infirmaries of England the sick and dying paupers have long had the best nursing that the kingdom can

supply. Why should not the aged and impoverished of Massachusetts in their sufferings and in their last hours on earth have like blessings?

The people, if fully informed, would not let their enfeebled neighbors in the almshouse suffer for lack of improved methods of treatment or for lack of proper appliances for their relief and comfort. Nor would the people, if they knew it, allow delicate orphans to be educated by the harmlessly-insane paupers. Again, if the people heard the sorrowful tales told to the officials in the outside-poor departments of our cities—if the woes due only to sickness among the poor were generally known in the community—then there would be far less misery. But in our crowded, hurried life those who can give help and would willingly give it, do not actually see the needs. The physician is in the best possible position to bring into relationship the helpers and the helpless. Difficult as is the great question of almsgiving, in cases of physical helplessness there can be no question. Suffering obliterates all social distinctions. As regards the able-bodied paupers, let the professional scientific philanthropists have their way; but for the sick and the dying, for the maimed and the feeble-minded, let us follow the prompting of our hearts! Of course, there is here great need of good leadership. At the outset there is need of professional skill in discovering the extent of the physical suffering and helplessness, and in pointing out the proper measures for relief. It is the physician's

public duty also to strive for the execution of these needed measures. He must follow the footsteps of Dorothy Dix. Her work was that of a true physician who recognizes his extra-professional duties.

III. The greatest advance ever made in medical science has been made during this last third of the century in making possible the prevention of many of our most dreaded diseases. Indeed, it may almost be thought that sanitation is a new science quite distinct from the science of medicine. But in reality there is no such separation, and the prevention of diseases will always be only a special department of our profession. The apparent separation is owing mainly to the fact that the sciences of organic chemistry and of bacteriology, which are the foundations of hygienic science, are younger than the leaders of the medical profession. Comparatively few physicians have had opportunity for such studies, and in consequence the profession as a whole has not grasped the glorious opportunities which the microscopes have already revealed. Even where attempts have been made to realize these advantages, disappointments have often resulted. Surgeons have clutched at the shadows of great principles. Too often they have trusted to antiseptics regardless of the essentials of asepsis, the new-found goddess of hygiene.

After such wondrous revelations as to the causation of diseases it might perhaps be expected that a whole generation of physicians must go and come before the full advantages of these great

discoveries can be realized. But it need not be so long.

There is no sense in the separation that exists to-day between the physicians in active practice and their brothers in the laboratories. Theory and practice must always go hand in hand if either is to be of greatest use. The bacteriologist, if he gives not half his heart to the widest clinical application of his knowledge, will lose his highest inspiration. And the busy practitioner who aspires to the highest fulfilment of his mission must now keep in touch with the searchers in the dimly-lighted world of germs.

The common meeting-ground for bacteriologists and for physicians and surgeons can be found in hospital work and also in the work of health boards. Fellows of this Society should never forget that Massachusetts owes her pre-eminence in public sanitation to the efforts of our former Fellow, the late Dr. George Derby, who organized our State Board of Health—the first in this country, if not in the world. I need not remind you of the great work now being done by this board under the guidance of its distinguished chairman and untiring secretary. But I ask you if the local health boards in our cities and towns deserve corresponding credit. The answer is shameful. The trouble is, that the men best fitted to operate this splendid machinery have not given to the Commonwealth that devotion she has the right to expect from all her sons. No grander opportunity has ever been offered to the medical pro-

fession than this of directing the work of public sanitation. Health boards have been authorized by the State in every city and town.[1] To these boards the State has granted almost dictatorial power, and yet in more than one-third of our towns no health boards have been formed. One of these derelict towns has over 10,000 population. Although many of them are small, that is no excuse for sanitary obtuseness. Where the community has been properly taught the importance of public sanitary work, such work has been cheerfully supported. And yet, in spite of the provision that in the larger towns one member of the health board shall be a physician, so negligent have we become of our extra-professional duties, that in many towns it has been almost impossible to persuade any physician to serve on the board of health, and in many other towns only second-rate men undertake such service. The best physicians say they have not the time, or they shun the notoriety and the possible unpopularity. As a necessary result the local health board too often lacks the confidence of the public and the coöperation of the medical profession.

Already, however, there are signs of improvement. Within the last few years the local health boards have formed a State Association for mutual improvement; and during the past year there has been a distinct advance in the coöperation of the bacteriologists and practising physicians. For this we are in part indebted to the City Physician of

[1] Chapters 218 and 473, Acts of 1894.

Boston, Dr. J. H. McCollom, who for many months generously gave his services to the physicians of this vicinity in determining for them the presence or absence of the diphtheria bacillus in suspected throats. Already in several other cities similar work has been undertaken. But is it not discreditable that this investigation of diphtheria is not being carried on in every city and town? Surely the health board in every community ought to provide for such work. Then might this modern curse of diphtheria be fought to some purpose. If not exterminated, at least it might be "in straiter limits bound."

Leprosy and small-pox have been conquered; and, as a crowning triumph of sanitation, the last invasion of Asiatic cholera was repelled from our shores. Why should we not also drive out every infectious and contagious disease? At least, the complete disinfection of materials — dwellings, furniture and clothing — is possible and practicable. In other countries disinfecting stations are so well arranged that a private house or a school-house or a factory can be promptly and thoroughly disinfected. This is done for the good of the public and, of course, at the public expense. Why should this not be done in Massachusetts? Why should we longer allow the public to be fooled with the useless fumes of sulphur?

Ever since the pilgrims, perhaps in consequence of their previous close confinement on shipboard, succumbed in such frightful numbers to the "white pestilence," pulmonary tuberculosis has maintained in New England its deadly pre-eminence.

Until Koch's discovery of the bacillus of the disease settled all questions of diagnosis, the physician might have been excused for sharing with his patients at first that feverish hopefulness so characteristic of the early stages, and afterwards the absolute hopelessness that so long precedes the end. But now there is no excuse for such professional helplessness — at least the disease must be recognized. In the early stages there is undoubted opportunity for cure. In the middle stages there is still a fair chance. And in all stages of the disease there is the absolute necessity of preventing the infection of others.

The modern treatment of tuberculosis and of diphtheria, as well as the recognition of these diseases in their earliest stages, depends largely upon bacteriological work which very few physicians have time and facilities for doing. One central laboratory, however, can easily serve a great many practitioners. And such laboratories should be organized, so that these modern weapons against infection may be freely placed in the hands of every physician in the State. This is the proper work of the boards of health. But how can such work be done except under the direction of the highest medical intelligence? No better illustration could be offered of the importance of our extra-professional obligations.

Massachusetts has taken another of her great forward steps in exterminating tuberculosis from our herds of cattle. No longer is it unavoidable that the seeds of this disease shall be given to our

children in their food. Would that we also kept the germs out of the air they must breathe!

True, it is a gigantic task that confronts us. Patients already infected with tuberculosis cannot be segregated as lepers are, and yet much might be done both for their relief and for the greater safety of others. Hospitals for diseases of the throat and chest might be established in our pine woods, in imitation of Sharon, and in our hill townships as well. Such sanitariums, properly equipped and properly managed, would effect the cure of thousands now doomed to die for lack of salubrious surroundings and modern treatment. To other thousands, already far advanced consumptives, such hospitals would give every possible chance, and at any rate give great comfort and relief; and at the same time, by bringing such patients under intelligent superintendence, much would be accomplished in preventing the further spread of the disease. Such measures, it is true, would entail a great outlay of public money. But the investment would bring most blessed returns. By affording every possible comfort to the hopelessly sick, and by giving to those who cannot afford either a change of climate or expert professional attention, the best hygienic surroundings and the recently greatly improved medical treatment, the State would have the moral right to require the stricter quarantine that is so important.

Tuberculous and healthy children should not be allowed to attend the same schools. For the tuberculous even better schools should be provided, and

might well be afforded by any community where the safety of the young is properly valued. Tuberculous operatives should not be allowed at the same benches nor in the same crowded rooms with others. In any shop or factory it would be wise economy for both proprietors and employés to arrange for this separation even by pensioning the afflicted.

But the separation necessary to prevent the spread of tuberculosis among school-children and operatives is only a small part of what sooner or later must be undertaken in every enlightened community. It is even more necessary to educate every tuberculous patient to such personal habits as will prevent repeated auto-infection, and at the same time ensure the safety of other members of the family and of the public.

That our foe is so mighty, so insidious and so firmly intrenched, ought to make us all the more eager to begin the fight. We must look out, too, that we stand shoulder to shoulder. Individual efforts will count for nothing. Even a single city or town could do little more than to set the example.

Plainly the lead must be taken by the health boards of the State, working in unison. This co-operation can be secured only by a greater devotion of the physicians in the public service. It is in this sort of extra-professional work — in stimulating the health boards to united, vigorous action — that physicians now have grand opportunity for usefulness.

We have now briefly considered three departments of public service where the knowledge and experience of physicians is greatly needed, in order to provide for all our people the advantages that now separately may be had here and there in other countries.

Under monarchical governments we might petition the king and his councillors for these reforms. But in a republic, reforms originate not in professional petitions, but in popular demands. The people are willing to be persuaded, and must be persuaded before they undertake reforms. Direct responsibility, therefore, rests upon those who alone are able to lead such movements.

In the evolution of this country we have not yet attained the condition of a perfectly representative government. And it is only in the higher development of this grand policy that our national hopes safely rest. Geographical sections may be represented, and voting districts may already be numerically equal, even political parties may be justly represented, but real representative government requires also that each class and profession and trade shall be represented. Such government, so far as our profession is concerned, can easily be obtained by concerted action. And one of the functions of the District Societies, and especially of the local circles of Fellows, ought to be the nominating of our representatives for public service in those departments where the help of our profession is needed. Such nominations would have the binding force that honor always imposes.

And the physician's public service would be far easier if undertaken at the request of his professional brethren.

But it is not enough that we strive merely to secure the election of our professional representatives. It is even more important that we shall take a greater interest in the public work. One of the sections of our annual meeting might very profitably be devoted to sanitary science. Public measures that especially concern the medical profession should be discussed; and our opinions as physicians should be made known at the proper times, that is, in the formative stages of legislation when such opinions may be of some use. There would then be less ground for pessimistic criticism of school and hospital and health boards.

The three great needs are, first, an individual recognition of our responsibilities for extra-professional or public service; second, concerted effort to secure proper professional representation in the government; and, third, a continued interest in the public service of our Fellows for their encouragement and support.

It may not be uninstructive for us to look at the amount of public service now being done by the nearly two thousand Fellows of this Society, who are practising medicine in two hundred and forty of the cities and towns of Massachusetts. Twenty-five are serving on school-committees, and twenty-five others are serving on health boards.

In pointing out our present failures in these respects, I should not be forgiven if I did not make

honorable exceptions. I see before me many of our older Fellows who in previous years have nobly earned exemption from further public service. It was their privilege to serve our country in the dark days of her sorest need. They gave freely of their youth and of their prime. No words of ours, at least in their presence, can fittingly express our joy and pride in having these heroes in our ranks. May they long enjoy our love and honor and gratitude!

And there were others, the comrades of our living heroes, who returned not from the battle-fields, but who there gave to our country the last full measure of devotion. At this memorial season it is especially fitting that we should hold them in remembrance. Nor could any anniversary of this Society be complete without their commemoration. Their lot it was to die in the midst of the nation's travail. For them there was no rejoicing over the new birth of perfect freedom, and over the restoration of the Union. But, like Dr. Warren, whose life-blood shed on yonder hill still quickens the pulses of patriotism, so these brave war surgeons, whose bones lie in the Wilderness, on the hills of Gettysburg, or in the swamps of the Chickahominy, have bequeathed to us the priceless blessing of noble examples.

Shall we prove ourselves worthy of our inheritance? In times of peace and prosperity shall we begrudge giving some small portion of our time to the public service in which they gave up their lives? Rather, as we return to our routine respon-

sibilities, shall we not also willingly assume our extra-professional obligations?

I plead in behalf of anxious parents, who would give their all to ensure the health of their children, but who do not know as you know, in what ways this might be done. I plead in behalf of the distressed, for whom the public would gladly do more if only the way were pointed out. And, finally, I plead in behalf of generations yet unborn, that this dear land of ours shall be more jealously preserved from contamination, in order that the Commonwealth of Massachusetts for the coming ages may be the healthful home of succeeding generations.

God grant that it may be so!

ARTICLE XVI.

THE SHATTUCK LECTURE.

THE NEW-ENGLAND INVALID.

By ROBERT T. EDES, M.D.
OF JAMAICA PLAIN.

DELIVERED JUNE 11, 1895.

THE NEW-ENGLAND INVALID.

THE provisions under which the Shattuck lectureship was established specify "Historical and other essays on the climate of Massachusetts or the diseases of its inhabitants, or such other subjects as said Society or its government may select."

These alternatives are surely liberal enough, and the committee have given me not the least hint to limit my choice, but it certainly seems in accordance with the wishes of the founder that some matter of decided local interest should be discussed in the discourse provided for by his liberality.

Common report and more or less jocose remarks attach the name of New England to one at least of the supposable causes of nervous affections. How justly is another matter, but it hardly requires this facetious etiology to make it appropriate for me to choose as my subject one which must have for every one of you, not strangely and exceptionally favored by fortune, a deep professional and often personal interest.

An eminent physician, not herself a native of New England, who looks upon a relative impairment of the reproductive functions as largely a phenomenon, though a highly complicated one, of acclimation and as closely connected with the neurotic constitution, says that "it *should* be more conspicuous in New England, whose rigorous climate differs more from that of old England than does the climate of the Middle States."*

* Dr. Mary Putnam Jacobi: MS.

Statistics, I think it is not rash to assume, are unobtainable as to the relative frequency of nervous invalidism in different portions of this country.

Inquiries of colleagues, whose wide and varied experience extends over more degrees of latitude than my own, have furnished me only with impressions, that less invalidism prevails north and south of the densely populated strip of coast from Boston to Washington and the great cities west of it. This, however, has undoubtedly far greater reference to mode of life than to climate, except so far as the latter influences the amount of out-door life.

Americans are called a nervous people. In fact nervousness has been called the American disease.

Can we easily believe otherwise when we consider how rapidly the proportion of city dwellers is on the increase, and then the "fundamental morbid social conditions and tendencies which give rise to the nerve-shattering character of the life in great cities. To the city throng, especially those classes of the population which are discontented with their social position and seek to better it, the clerk and storekeeper who wishes to become a merchant and millionaire, the mechanic who would make of himself a manufacturer, the artist, writer, and specialist who thirsts for gold and distinction, the official who looks for a swift promotion; and, not less, the country laborer who hopes to find there better wages and more enjoyable life. All these meet, in their struggles to better their circumstances, a crowd of competitors who look and strive just as eagerly after the shining mammon, after the idol of fame and distinction beckoning in the distance; and are not always careful of their means of reaching it. Then all the strength must be exerted, and if the nervous tension is not sufficient for the demands upon it, it must be helped with stimulants; tea and coffee and strong cigars must be made to spur on the jaded nerves, and hypnotics force a troubled sleep."

You give me credit perhaps for a very good piece of description and a just appreciation of our dangerous conditions; but undeservedly so. These last sentences do not describe Boston or Chicago, but are from a writer in the quiet city of Munich, supposed to be devoted to classical art and to beer. Here can be no restless political ambition, no worship of the almighty dollar, no complicated American drinks.

This author (Lowenfeld) explicitly rejects the claim of Beard for nervous prostration as an American peculiarity.

Is not the disposing cause the spirit of the times and not the spirit of the country? Nervousness attacks the centres of civilization and of great interests, because there are concentrated those whose nervous disposition renders them more sensitive to the irritations of unrest, discontent and worry.

Whether we have more than our share is not easy to say; it would certainly not be strange if it were so. But there is no doubt that we have enough to make the subject one of the highest importance.

There are directions in which a historical treatment of the subject might be made very interesting, but neither my time, my opportunities nor my sense of what is due to this Society have permitted me to offer a resumé of the literature instead of my own gleanings, however scanty, from a field unfortunately only too familiar to most of you.

The question as to the gradual increase of nervousness, of nervous invalidism, like that of insanity, is a very interesting one, but, again like that, a difficult one to answer with precision; even more so in our case, since we have not even the approximately accurate information of hospital and census returns.

It must, of course, be admitted that these are not conclusive. And that any apparent increase of recorded insanity, instead of showing a progressive deterioration, is

more likely, on the contrary, to be an index of more careful diagnosis and more efficient treatment, we are glad to believe.

Even such an approximation as a comparison of these returns afford, we cannot have in a matter so much less distinct, and affecting the community legally and financially so much less than does insanity. When the question of the relative health of successive generations comes up, one is apt to hear that some one remembers his grandmother or his great-grandmother who had a very large family and hardly knew a sick day. This, however, is not so conclusive as it appears, for it is most probable that it is one out of two grandmothers or four great-grandmothers who had the large family who is best recollected, while the other three who had only one or two children have naturally left fewer descendants to sing their praises; or, what is much more to the purpose, one remembers his robust grandmother better than he does his invalid great-aunt.

Neurasthenia has not been long enough separated off as a distinct condition to have accumulated around itself a mass of ancient literature.

Hysteria, however, has done so, and its columns in the Index Catalogue of the Surgeon General's Library number 34, including 210 titles of books on the general subject alone, going back to the latter part of the seventeenth century and becoming quite numerous in the early part of the eighteenth.

If, however, we accept, as I think we are justified in doing, miracle cures in the case of young women invalids, as very strong presumptive evidence of some kind of purely functional nervous affection, we can hardly say when we begin to get such cases.

I hope I shall not be accused of irreverence if I say that some of the miracles of the New Testament seem to have been of this kind. Hysterical trance is not an excessively

rare phenomenon, the Jews are notoriously a neurotic race, and such cases have been mistaken for real death.

Cases and epidemics, evidently hysterical, are not rare in history, although of course it is those of a violent and, so to speak, picturesque character which are more likely to be recorded than the neurasthenic and bedridden types.

Even if it turns out that nervous invalidism is not a disease exclusively of the present century, or of Massachusetts, or of New England, it is certainly not necessary to tell you that the conditions at work to produce it are as abundantly present here and now as anywhere, and it would only be a reminder of a considerable portion of your own labor, anxiety and trouble if I were to insist upon the importance and living interest of the subject to every one of you.

The New-England invalid is with us all. The old doctor has carried her all his professional life, and yet she is ready to bestow the care of herself upon the young man just making his reputation, and proud to be trusted where so many have failed. No specialist can escape her, for she has a symptom for every organ. The physician cannot dispose of her to the surgeon, for, after her braces have given out, after her spine has been shortened by a vertebra or two, after her pelvis and her pocket book are alike empty, she comes back to him "needing ONLY to be built up."

The surgeon can never flatter himself that he has seen the last of her, for when her ovaries and uterus have been safely bottled up where they can do no more harm, her kidneys may desert their proper sphere, descending to carry on the nefarious practices of their predecessors at the old place, or his first operations are successful only in providing a new location for a pain, to be cured by another.

But your troubles are the least. You see her occasionally. You must go, to be sure, when you know there is nothing to be done and you have not the time to do it. You must listen to the thrice told tale of symptoms which you

are as morally sure have nothing to do with any tangible lesion as if you had the patient upon the dissecting table. You must prescribe drugs which you know are useless and which you hope are inert, because you must appear to do something, or, worse yet, you may be driven to use those which are worse than useless, and which you too well know are not inert, because the necessity is absolutely forced upon you, and you cannot bear the charge of wanton cruelty, hoping that at some future day their use can be easily abandoned.

You are doing the most discouraging of work. You feel that you are in a treadmill from which there is no escape until you can resign your burden to another whose ignorance will give him enthusiasm, or are dropped discredited for a newer sensation.

But the mothers and the sisters, the husbands! for whom there is no holiday. The unwearying response to the constant call for relief from the pain which it is no satisfaction to them to call "functional irritation," from the distresses, the burnings, the flutterings, the quiverings, the throbbings, the tensions, the relaxations; the reproaches for indifference, the accusations of selfishness and the more trying repentance therefor, the ostentatious resignation of the misunderstood, the sympathy which they crave, the constant outflow of nervous force for which there is no adequate resupply in a confident hope of recovery; is it strange that we hear so often: "If you cannot take her there will soon be another?"

Is she not worth studying?

Among the earliest to call attention to the health of American women as a class, and not simply with a view to the treatment of individual cases, was Miss Catherine Beecher in her "Letters to the People on Health and Happiness," published now some forty years ago.

Without pretending to speak from a strictly medical point of view, but rather as an experienced teacher and

philanthropist, and evidently a cultivated woman of sound common sense, she took great pains to ascertain facts. The quotations I shall make are of value as testifying not merely to the conditions at the time of writing, but, by contrast, to that of her childhood some fifty years before. Miss Beecher was born in 1800, and for many years kept a large and celebrated school for girls.

She says: "But the American people have pursued a very different course. It is true that a large proportion of them have provided schools for educating the minds of their children; but instead of providing teachers to train the bodies of their offspring, most of them have not only entirely neglected it, but have done almost everything they could do to train their children to become feeble, sickly and ugly. And those who have not pursued so foolish a course, have taken very little pains to secure the proper education of the body for their offspring during the period of their school life.

"In consequence of this dreadful neglect and mismanagement, the children of this country are every year becoming less and less healthful and good looking. There is a great change in reference to this matter within my memory. When young I noticed in my travels the children in schoolhouses or on Sunday in the churches, almost all of them had rosy cheeks, and looked full of health and spirits. But now, when I notice the children in churches and schools, both in city and country, a great portion of them either have sallow or pale complexions, or look delicate or partially misformed.

"When I was young I did not know of any sickly children. But now, the children grow less and less healthy every year.

"Every year I hear more and more complaints of the poor health that is so common among grown people, especially among women. And physicians say that this is an

evil that is constantly increasing, so that they fear, ere long, there will be no healthy women in the country."

Later, after several pages of statistics, evidently gathered in a scientific spirit and with a clear appreciation of the possible errors in that deceptive source of knowledge, based on enquiries among hundreds of representative individuals, and finding among them and their acquaintances a very large proportion of invalids, with a very small number of really healthy women, she speaks of her personal knowledge as follows:

"I am not able to recall, in my immense circle of friends and acquaintances all over the Union, so many as ten married ladies born in this country and century, who are perfectly sound, healthy and vigorous. I have nine married sisters and sisters-in-law, all of them either delicate or invalids except two. I have fourteen married female cousins, and not one of them but is either delicate, often ailing or an invalid. In my wide circle of friends and acquaintances all over the land out of my own family circle, the same impression is made. In Boston I cannot remember but one married female friend who is perfectly healthy." And the other great cities according to her are no better.

Miss Beecher saw in all the melancholy picture which she drew merely the natural result of a neglect of well known hygienic laws, and published her book in order to call the attention of her country women to them. Let us hope with effect. It is certainly my belief that many of these laws are, if not better known, more generally heeded than they were then.

I have so far made but little distinction between the various forms of chronic ill-health among women, and this for the reason that the distinctions were practically but little known to the lady whom I have quoted. Miss Beecher, indeed, is inclined to lay especial stress upon uterine displacements, but those who are familiar with the

rapid and constant changes in gynecological theory will see in this nothing more than a deference to the prevailing fashion at the time she wrote. Her statistics are not detailed enough to have great weight in this particular. Her therapeutics are of more general application.

For three years and a half I have had opportunities for observing a considerable number of chronic female invalids from among whom serious pelvic disease, other chronic diseases, and distinct forms of insanity, have already been weeded out by competent diagnosticians; and also a proportion of the more acute and curable forms removed, so that my clientele includes very largely cases of selected chronic invalids without obvious organic disease. It is this circumstance, and not any desire to prejudge the question, which had made me use the feminine gender throughout.

How the number of female invalids in the community would divide up between ourselves and the gynecologists it is not easy to say, since the numbers we receive, as well as those which find help in the hospitals devoted to the diseases peculiar to their sex, are limited not by the demand, but by the number of beds these institutions respectively offer; and these are not enough.

Many also go from one to the other, and it is by no means beyond the limits of possibility that the mere fashion of the day or the personal views of the patient determine at which kind of institution she first seeks relief. Indeed, even in the concrete, when the case is actually before us, I find that my gynecological brethren as well as myself are sometimes at a loss to know upon which set of symptoms, pelvic or nervous, both being present, the chief importance is to be put, and to determine which is cause and which is consequence. That vicious circle of which these two sets of symptoms form a large part of the circumference is likely to be completed and complicated by a third set seated in the digestive apparatus.

In going over the records of one thousand persons, with a view to classification, I have made, excluding cases which are either not essentially nervous or of a kind not to interest us in the present connection, the following classes, melancholia, neurasthenia, hysteria and hypochondriasis. This list does not indeed take cognizance of all the doubtful and mixed cases, of which there are endless combinations; but a classification which should undertake to do this thoroughly would amount to but little beyond affixing a name to each individual case, or at any rate would break up our figures into such small groups as to have no value for statistical purposes.

I have arranged 97 as melancholia, 490 as neurasthenia, 197 as hysteria and 33 as hypochondriasis.

I have no doubt, however, that if the same material were submitted to a dozen different neurologists every one of them would make a different distribution from this and from all the others, often widely so.

Even if we admit that neurasthenia is a distinct and separate well-marked morbid entity, I think no one of experience will doubt that it is easy for hysteria to assume many of its features, as well as those of melancholia and hypochondriasis, and, on the other hand, the soil of neurasthenia is one upon which any or all the other symptom-groups may very easily flourish.

A little more elaborate, and perhaps quite as practicable, a classification might be as follows:

1. The Malingerer, pure and simple.
2. The Exaggerator.
3. The Constitutional Neurotic.
4. The Hysterically Excitable.
5. The Neuromimetic.
6. The Confirmed Neuromimetic.
7. The Tense Neurasthenic.
8. The Limp Neurasthenic.
9. The Melancholic.

The extreme cases of many of these classes take us very close, and in melancholia distinctly beyond, the line of actual insanity. To speak of these in a little more detail:

1. The malingerer, feigning disease out of the whole cloth, in which she has no belief, I do not think I have ever seen in the female sex. I am inclined to doubt her existence outside of hospitals or workhouses, or perhaps in the rare case of malicious girls seeking to gratify a grudge or gain notoriety, like those, for instance, who were the principal accusers and witnessess in the days of Salem witchcraft.

I think that most women, unless instigated by some very special motive, who might feign disease for any length of time, would be almost sure to end by believing in it themselves.

2. The exaggerator we all know well, honest but whimsical, silly and self-indulgent.

3. The hysterically excitable, with her acute exacerbations, is also sufficiently familiar. Much of the earlier literature under this title of hysteria relates to this form.

4. If one were willing to use the vernacular in a form which might be offensive to those to whom it applied, he would be likely to speak of that class here called "constitutional neurotics" as "cranks" or "crooked sticks," persons whose inherent peculiarities of nervous organization are such as prevent them from acting or living in harmony and comfort with a community of a more average and less peculiar character. They are mild embryo paranoiacs.

Some theorists might substitute for the word "constitutional" "congenital," but this seems to me objectionable as emphasizing too strongly the tendency which undoubtedly exists in many if not in most cases; but which, I believe, can be, to a considerable extent, either aggravated or relieved by the environment of the early years, to the extent even that education may have almost as powerful an influ-

ence as heredity. Habits of thought are largely formed and modified in childhood.

5–6. The next two groups, or neuromimetics, for which, with some enlargement, Sir James Paget's expressive name is used, are, in the first, those grades of hysteria involving anæsthesiæ, paralyses of all sorts, severe neuralgias; which, in the second, become contractures more than spasmodic, with wasting and with a marked decrease in the hopefulness of prognosis as time goes on. Among these are the most remarkable cases of invalidism, and also of the marvellous cures thereof.

It must be acknowledged, though I hardly know whether with sorrow or with pride, that the hysteria rendered classical by Charcot, the concentrated, highly educated and fully developed hysteria of the Salpetriere, is not the prevailing type with us. The American neurologist must content himself with fewer and less picturesque cases.

Neurasthenia has been divided into two groups, according to its type rather than anatomically, as is more usual, the latter appearing to be a classification according to what we might expect rather than what we see.

7. The tense neurasthenic is apt to be small, slightly underweight, with a dark complexion (though with many exceptions), poor appetite, constipation, flatulence, a quick pulse and heart beat, and a sphygmogram that indicates no great amount of force in the heart, but considerable resistance comparatively in the arteries, like that supposed to belong to interstitial nephritis, although of much less vigor. She will talk to you about books or science, if inclined in that direction, and often very interestingly, as well as about herself; but when she does reach the more important subject she describes herself as "all keyed up," "thinks she shall fly," and so on. You can see that she is making constant movements for no purpose except to work off nervous tension, and many of her muscles are in a state of contraction when

doing no useful work. A limb is kept in position, not by relaxing all the muscles and letting it rest, but by contracting the antagonists on each side. Her rigging is set up too taut.

By reason of these feelings, and not always because of any pain, she is likely to sleep badly. She cannot work without headache and backache, but she tries to get sleep by overexertion, and usually with poor success. It is upon this class of cases that the usefulness of the Delsarte system as a therapeutic agent chiefly rests. It aims to cut off a useless and wearing expenditure of force.

Some fourteen years ago I took a number of sphygmograms among the patients of the Adams Nervine Asylum (see Boston Med. & Surg. Journal, May 19, 1881), and found nearly all of them to have a character closely resembling that to which Mohammed was at that time exciting a great deal of attention by declaring the precursor of chronic Bright's disease. In fact they agreed very well with some which were actually of that character.* Several of these patients have recently been heard from, and, so far I am aware, not one of them has died of renal disease.

8. The limp neurasthenic is apt to be of a lighter complexion, and may or may not be well fed. Her bowels are sluggish, but less obstinately constipated, and her appetite and digestion are below par. She does not speak of her "nervous" feeling, but talks of being tired, and when she sits or lies is quiet and does not strain her muscles. She is apt to say that "all she wants is rest," and yet she may have been doing nothing but rest for years. She is less likely to care for matters outside of her own condition, and I should say her prospect of recovery were on the whole more distant than those of her predecessor on the list.

Either of these conditions may be more or less chronic, and accompanied by more or less of the headache, backache and incapacity for mental exertion.

* Compare tracings No. 1 and 14.
No. 1, typical interstitial nephritis; death. No. 14, cure by faith; now well.

9. The melancholia of our inmates includes chiefly the milder forms known to alienists under that name, although of course now and then a case is met with which has very evidently gone far beyond the line of insanity.

As I have reminded you, the literature of hysteria goes back many centuries, but chiefly with reference to the more acute and striking forms, while anything like a careful study of the neuromimetic, for our purpose much more important, forms, is a more modern growth, reaching its culmination only under the auspices of Charcot and his school. It is quite evident that the cause of hysteria, or, at least, of the spasmodic hysteric manifestations, is to be sought for in no modern or local conditions. It might perhaps be questioned whether the more modern habit or manners of repression, of keeping the feelings concealed, a habit which increases with civilization and fashion, with higher social position, and is especially strongly marked in our Anglo-Saxon race, has not a good deal to do with the diminished prevalence of the more outspoken and striking forms, and the substitution therefor of the quiet, insidious, obstinate paralyses which so closely counterfeit organic disease, and are in reality so much more serious than a good old-fashioned hysteric "fit" which comes on slight provocation and is soon over.

Would it not be better if our customs and "good form" permitted a patient to scream, as she so often says she wants to, instead of restraining her feelings for propriety's sake, and developing a neuralgia or paralysis or an attack of "nervous prostration."

It is held by Breuer and Freud that the essential part of the action of mental or moral shock in the production of hysteria lies in the absence of the appropriate motor reaction, as, for instance, when a lower official received from his superior an insult which he could not resent. The correctness of this view seemed to be demonstrated by the

result that when the history of the affair was completely elaborated by hypnotism and fully talked over, the hysterical symptoms disappeared. This is not far removed from ordinary observation that it is much better to "get mad" and be done with it than to cherish the grievance in silence. The effort of inhibition seems to call for as much nervous expenditure as that of action, and in such a case as that just cited is of that peculiarly unremitting and wearing character which is so silently destructive of nervous integrity. There should be a proper balance between inflow of irritations and the outflow of motor energy.

Neurasthenia on the other hand is, by name at least, a much more modern development. The name is hardly twenty years old, and although the condition itself must have been occasionally met with, perhaps for all ages, yet its prevalence is a growth of modern times and a part of the price which we pay for a more complicated civilization. It is certainly much less prevalent among those whose labor is chiefly manual and involves but little responsibility. The histories of one thousand persons show this quite clearly, in the great preponderance of teachers, students, nurses, milliners and dressmakers, over domestic servants or factory hands. In this respect it differs distinctly from hysteria.

I do not recollect hearing of a case among the negroes, nor does my scanty knowledge of the subject furnish instances among the uncivilized races, where again hysteria seems to be well known. It is somewhat difficult to draw the line with certainty, however, between the different occupations which may be claimed as nervously exhausting. I recollect a girl in the City Hospital who said that her doctor had told her that "her brain was all worn out," and when I enquired further as to the nature of this exhausting employment was informed that it was pasting stamps upon shoes.

The relations of uterine disease and neurasthenia are interesting and important. No one now supposes that there

is any necessary and specific relationship between such disease and hysteria, the most cogent argument being that men, although much less frequently, become typical subjects of the nervous affection. The logical connection between the two conditions in a particular case, both being present, is far from easy to establish, and when it becomes doubtful as to how far either of them may have become dependent upon imagination, habit, or a fixed idea, the task becomes still more difficult.

A considerable amount of irregularity of the uterine functions, or rather a great increase in the amount of pain and general disturbance with which they are accomplished, is a common result of what is clearly a nervous condition, as much so as the gastric, intestinal and cardiac symptoms. It is quite true of "nervousness," as has long been remarked of hysteria, that the more serious organic affections, like fibroid or cancer, have no special tendency to its production except, of course, so far as hemorrhage or long continued pain may do so.

"Many of the nervous and even mental disorders, often assigned to 'reflex ovarian irritation' are the direct expression of cerebral disease or cerebral malnutrition, which also causes the vaso-motor paresis in the vascular territory of the ovaries."*

On the other hand, there are among our patients, even with the careful selection to which they are subjected before their admission, some in whom the much accelerated recovery after local pelvic treatment of the uterine symptoms shows that they are neither imaginary nor merely an accidental coincidence.

There is a belief, however, acknowledged and acted upon, that in some cases the effect of operative treatment is due to its decided psychical effect, in regard to which I shall have occasion to speak farther on. One may consult on

* Dr. Mary Putnam Jacobi: MS.

this point with great advantage a paper by Dr. J. William White, on "The Supposed Curative Effect of Surgical Operations *per se*." Annals of Surgery, Aug. and Sept. 1891.

When, however, the "slight local treatment" to which one of our patients attributed her partial improvement consists, as we know from other sources that it did in her case, of a removal of both ovaries, the matter is worthy of serious consideration.

Twenty-seven persons whose names are upon our books have had both ovaries removed for the relief of nervous symptoms. These organs were in some cases healthy or nearly so, and in others indurated and adherent. Of these, three or four recovered or nearly so, one or two of them having been not very far from the natural menopause.

Three or four others have improved after years of invalidism, so that it may well be doubted how far their recovery was accelerated.

One died of pulmonary tuberculosis and other diseases not connected in any way with the operation. One died of cocaine, one shot herself six months after "a highly successful operation."

Another case, herself a physician, in no way connected with the Adams Asylum, underwent the operation, partly, but I could not make out just how largely, at her own desire. She had had convulsive attacks, probably hysterical, and progressed steadily to hopeless insanity.

She had been an advocate of the operation, and had urged it upon a patient whom I had referred to her but who recovered without it, and at a later period called upon her in her own sickness. I do not know whether the merits of the operation were discussed at that interview, but the subject might have given rise to a very interesting conversation.

Our experience would not support the usual statements as to the almost absolute harmlessness of the operation.

One of our patients, a strong and comparatively young woman who suffered extremely from dysmenorrhea and hysteria, was, at her own request and after a full explanation, submitted to the operation at a hospital where you would admit that as good surgery is done as can be done, and died in a week, with no trace of septic infection, but apparently solely of the nervous shock taking the form of stuporous melancholia.

The conclusions to be drawn from these cases are that the chances of improvement from the removal of healthy ovaries from a young woman affected with nervous symptoms are exceedingly small, and that the operation should be reserved for those desperate cases where nothing else offers a prospect of relief near or remote, and where death may fairly be considered preferable to a suffering life.

The chance of a favorable psychic effect may be fairly offset by the much greater probability of an unfavorable one, in the development of a new set of morbid ideas, the disappointment at failure, the feeling that she is not like other women, and the chance of death.

When ovaries are distinctly diseased or the tubes filled with pus, or hemorrhage from a fibroid is wasting the patient's strength, then the question is no longer neurological but surgical, and should be looked at solely from that standpoint.

It is worth noting at this place that 276 married women under sixty, in regard to whom this point was recorded, had 566 children. Sixty-two were childless, seventy-one had one child each, fifty-three two, and there were only eight who had had more than six.

Theories of autointoxication are not easy to deal with clinically in the absence of extensive laboratory facilities, of which the chief and most essential would be a chemist such as there are but few of.

When the blood in quantity is not to be obtained, the ease with which either an excess or deficiency of a given

substance in the urine can be interpreted to mean an excess in the blood or in the tissues, gives an elusive character to the research more entertaining than instructive. A good many examinations have been made in the cases now under discussion which have gone beyond the determination of the presence or absence of albumen, but have not been numerous or regular enough in most cases to enable the course of elimination to be watched for any length of time. There is not a great deal of interest to be found therein, except possibly the general conclusion that the vital metamorphoses, as indicated by urea, often uric acid, and the total amount of solids, are taking place but sluggishly.

The urine is apt to be small in quantity, and, although of high specific gravity, not sufficiently so to bring up the total amount of elimination to the normal standard; normal, that is, as regards a person on full diet. There is, however, no reason to look for any poisonous retention due to deficient action on the part of the kidneys.

The phosphates have been determined only in a few cases from the feeling that, however close the relation may appear on chemical grounds between their excretion and the combustion of nervous tissue, yet the amount of variation in the quantity derived from this source would be so entirely obscured in the much larger quantity derived from the tissues generally and from the food, as to be not worth considering, unless the latter, the food, can be brought to a constant value, a condition not easily carried out.

In view of recent theories of the relation of neurasthenia to so called lithæmia, and headache as a special symptom, a considerable number of quantitative determinations of uric acic have been made, which seem to me to lead to the unexpected conclusion, that although there may be, as Dr. Haig's observations seem to show, such a thing as a uric acid headache, the neurasthenic headache is not of that character.

For reasons easily understood no search was made for organic substances like paraxanthine, requiring the evaporation of several litres of urine for their detection.

It is a rather singular fact, considering the wide diffusion of the lithæmic doctrine, that "suppressed gout" is mentioned only once in our papers as among the probable causes of nervous prostration.

The number of cases among 65 in which the proportion of uric acid to urea was determined in which it exceeded that laid down by Haig as the average, namely $\frac{1}{33}$, is very small altogether, and in most of these for only a single observation each. There is nothing in common to them which would enable one to connect this condition with any degree of probability, to any special symptom. The largest, $\frac{1}{12}$, was in a case of neurasthenia, where the total urine for 24 hours was very small, c.c. 400, and the urea corresponded, while the uric acid was apparently a little increased with reference to the usual daily output. The only case where an increased proportion corresponded to severe nervous symptoms, was one of very persistent headache, so severe and so constant that the idea of organic disease was entertained but never found other sufficient support. The fractions found at various times were $\frac{1}{26}$, $\frac{1}{36}$, $\frac{1}{30}$, $\frac{1}{34}$, $\frac{1}{32}$.

It is important to note that in this case, where there was no pronounced gastric disturbance, the weight constantly diminished.

In another case, in many respects similar, but where the weight increased without a corresponding improvement in the headache, the proportion of uric acid to urea was mostly between $\frac{1}{50}$ and $\frac{1}{60}$.

Other cases of increased proportion were of gall stone; hysterical paraplegia and contracture, with great emaciation and gastric disturbance; chronic gastritis, improving and gaining weight; agoraphobia; debility; melancholia;

severe dysmenorrhea and hysteria; convalescence (rapid) from hysterical vomiting; and idiopathic anemia.

In the cases where a number of observations were made upon the same patient it is just as difficult to trace any constant connection between excretion and fluctuation in symptoms. Since however an increased amount of uric acid in the urine may mean either that there is a large amount in store, or that it is being rapidly washed out, and on the other hand a diminished quantity may mean either that little is being formed or else that it is being held back in the tissues or again in the blood, it is very difficult to use these figures against any theory which might be brought forward.

As to the total daily output of uric acid it is equally difficult to connect increase or decrease with definite symptoms. In not a single instance did it reach one gramme per diem. The nearest to it (.870 mgr.) was from the case of gall stone.

The case of severe headache with a large proportion, also had rather a large total amount in 24 hours.

An autointoxication theory might easily be built upon the extremely frequent and important connection between constipation and conditions of great depression.

It is important to correct this symptom, and a permanent improvement is very likely to accompany the abatement of nervous symptoms, yet the latter does not follow with that speed and certainty which we should have a right to look for if melancholia were merely a sort of narcotism from retained intestinal toxins. There is as yet no distinct chemical evidence of such an action.

The secretion of the skin is as likely to be increased as diminished, so far as quantity goes, and I am aware of no observation as to its qualitative condition.

In short, we may say that while it is very important for therapeutic purposes that all the secretions should go on

properly, we cannot point to any one of them as more to blame than another as holding back excrementitious matter, nor to any one constituent as the specific poison.

The making of fat and blood are almost proverbially connected with the cure of nervous debility, since their development has been systematized by our distinguished countryman Weir Mitchell and his followers.

Blood examinations are not difficult nor time destroying to make, but are unfortunately wanting in accuracy, when dependent upon color comparisons as so many of them are. Many such have been made by myself, and afterwards the same specimen estimated by several of the nurses, who acquired a considerable experience. The discrepancies in the individual readings of the Fleischl hæmometer were usually decided and the averages varied between different observers within quite wide limits, and, what is especially unfortunate, the differences were not constant and no personal equation could be established by which the reading of one observer could be reduced to that of another. I found in my own case that I almost invariably read a higher percentage than any of the nurses, but the difference was not constant. I did not however obtain absolutely high results. I think the establishment of a physiological standard by a large number of observations and also some sort of approximation to the limits of error in personal equations, would be a very useful piece of work. In the hands of the same observer, however, for purposes of comparison the Fleischl hæmometer is a very useful and convenient one.

For the globular richness the hemocytometer of Hayem and Gowers, especially in the form now usually employed of Thoma-Zeiss, is, if a sufficient number of observations be made, an extremely useful instrument for diagnosis, but as many of you know, a most wearisome and time-spoiling one. A standard for this is needed also.

I have a strong impression, based however on too small

a number of observations to make it more than that, that the Thoma-Zeiss now in use would give a considerably higher average that a Gowers made in this country which I employed some years ago.

An extremely useful instrument, not requiring so much delicacy of manipulation as the blood-counter or the color tests, and giving, it seems to me, very trustworthy results, is the contrifugator or hematocrit as improved by Dr. Daland and Mr. Metzger of Philadelphia. This gives the actual proportion, by bulk, of red corpuscles in a large drop of blood and, with a little care, the white corpuscles too can be determined with a useful degree of accuracy. With this instrument and the Fleischl it seems to me that the condition of the blood can be followed with only a moderate expenditure of time, the numerical estimation and the differential examination of white corpuscles being needed chiefly for a single or repeated diagnostic examination.

When we speak of anemia, however, we have in mind two different conditions which are very apt to be confounded. By local anemia we generally refer to the bulk of fluid blood brought or remaining in the part, but when we talk of anemia in general, it is a question, not of bulk, but of richness in corpuscles and color, forgetting that it is just as possible that the total amount of blood in the body may be deficient as that contained in some portions.

This total quantity it is evidently utterly impossible to measure; in fact it is so difficult to measure even after death that the physiologists have been unable to get at it with satisfactory accuracy except by quite elaborate procedures. We can only guess at it by the color of the skin and visible mucous membranes, the tension of the pulse, and the rapidity of flow from a puncture and so on, which are all obviously only rude methods of making several local estimates to be combined into a general one. I have certainly found what seemed an abnormal difficulty in obtain-

ing from a puncture a satisfactory amount of blood for some examinations, on account of the sluggishness of the flow, in cases where the quality was not very deficient. There seems no reason why this total quantity might not vary considerably in different persons, as well for instance as adipose tissue; so that a person with a very good count as regards corpuscles and color might really be anemic, *i. e.*, not have enough blood to go round properly.

Speaking in a general way I should consider a large part of our patients somewhat anemic as to quality, *i. e.*, they have a count a little below the normal and a color a little below that again, as is well known to be the rule in symptomatic anemia, and the reverse of the relations existing in pernicious anemia. The quantity, had we the means of measuring it, I feel quite confident, judging from the complexion, the slow bleeding from punctures and the peculiar pulse and tracing, would be decidedly below the standard of health.

Hence many of them "pan out," so to speak, in the instrumental tests, better than they look and better in fact than they really are.

On the other hand extreme anemia, excluding cases of of organic disease other than nervous, is not common. When found in a patient sent in with a diagnosis of some functional nervous trouble I consider that it calls for special care in the search for some underlying condition.

A very good blood color, *i. e.*, one of 75 or 80 per cent. Fleischl, is not at all inconsistent with serious and persistent debility and many nervous symptoms. I speak of this as "good" because I am sure that it may often be found in persons in excellent health. I cannot get much above this in my own person, and I have heard the same remark made by a colleague of sufficiently healthy embonpoint and rather an unusual (for an American) floridity of complexion. The statement has also been made by others that the standard

(100%=normal) of the Fleischl is set too high for the average American.

Thus a good blood count is of favorable import as regards the condition of the general health and, of course on that basis, of a favorable tendency as regards special nervous symptoms, but it is not at all conclusive as regards speedy recovery. One patient who had a color test of 87 per cent. has been an invalid ever since and has applied to be re-admitted. Another with 87 per cent. was somewhat relieved by local uterine treatment but said she never expected to sleep well again. Several others with from 75 to 95 as determined here have remained invalids for months after leaving, including one case of chronic insanity with delusions.

These cases are not brought forward as a basis for a rule, for the examination has not been made as a matter of routine. Most patients, where the general appearance coincided with the symptoms, were not examined at all in that way. One of the most striking cases was that of a woman whose appearance, emaciated, pale, worn and distressed, corresponded exactly with her complaints of pain in every part of her body, which we, as well as our predecessors and successors, found it equally impossible to account for or to relieve. We have heard that she has since been in an insane asylum. She had, however, two days after admission, color 75, corpuscles 4,650,000. Three weeks later color 66, and two months and a half later 76.

In fact, the relations of blood-richness, quality and local distribution may be best understood by a comparison to the water supply of a large manufacturing and business city and an outlying suburban district. A moderate diminution will not be allowed to interfere with the working of the important interests of the great centre but will be shown chiefly in the dirtiness of streets and a want of color in the outlying lawns and gardens, while, on the other hand, no

possible abundance, though it may make the wilderness to blossom like the rose, can restore business activity to machinery and apparatus which is not fitted to make use of it. If water wheels are broken down and rusted from disuse in a long continued drought they cannot be set going to advantage all at once by a freshet.

This comparison might be carried a step further by suggesting that the quality of blood, as well as of water, may vary in different parts of the same system. It is strikingly shown, not only by well known chemical results, but by the interesting observations of the younger Mitchell on the immediate increase of the red corpuscles after massage, showing that they must have been stirred up and put in general circulation from the deeper portion of the vessels just as a local freshet or energetic gang of loggers increases the logs in the river below. The time is too short to make a theory of new formation at all tenable.

It is more than probable that many of the nervous symptoms connected with disturbances of the circulation depend rather upon deficient blood tension, pressure and supply than upon its exact chemical composition. A person with blood of the richest quality may faint on very slight provocation if the heart's action is so depressed as to suddenly alter the cerebral pressure. On the other hand the frog's reflexes act for hours after his blood has been thoroughly replaced by a solution of salt. A similar result is seen in the rapid restoration from intravenous salt injections in the cholera patient, whose blood is too thick instead of too thin, and in other kinds of collapse, where a hemorrhage has drained the vessels of their contents as a whole, without any proportional impoverishment of any special element. The condition of the circulation in a considerable number of neurasthenics may be described as a too small quantity of blood which is a little "off color" pumped feebly into resisting arteries.

The general nutrition, as indicated by gain or loss of weight, is usually looked upon as having special significance with reference to prognosis and treatment in functional nervous affections, and increase in flesh with increase of nerve force as almost convertible terms.

It is highly satisfactory to have so simple a standard. Fortunately it is often correct, and cannot in any event easily lead to any harmful error, but it is worth pointing out that there are important and not rare exceptions to the rule.

A considerable and nearly constant rise of weight, in a case which is decidedly under weight to begin with, is undoubtedly of favorable import. It proves of course that the digestive organs are doing their work with effect, even it if should happen to be with some difficulty and discomfort. If this be accompanied with decided and more or less parallel gain in the specially nervous symptoms, like insomnia, headache, backache and general strength, the prognosis is decidedly favorable, not only as to speedy but somewhat permanent recovery.

Where, however, the gain is slow and slight and the nervous symptoms do not improve for some time, it seems highly probable that the patient, even if ultimately materially better, will be very likely to fall back again when the surroundings become less favorable.

If the patient be already of sufficient body weight the desirability of increasing it is not great, and if a gain is made, or at least any extreme gain, it cannot be considered an advantage.

These remarks apply especially to well marked neurasthenia and melancholia. Fat hysterics and dements are sufficiently well known.

A constant and decided loss of flesh is of course an exceedingly unfavorable condition, but I can recall at least one case where the patient made a fluctuating record of weight

with the ultimate loss of a pound or two, having been below weight to begin with, where the general improvement went on in a similar fluctuating way, but at the time of discharge was in every respect a considerable one. Generally the fluctuations which occur coincide pretty closely with the improvement, or the reverse, of the other symptoms. One case, however, being rather a stout woman of the flabby neurasthenic type, gained quite rapidly in weight for some months, and at the same time slowly as regards nervous symptoms. Then she fell off less rapidly but steadily in weight, but did not lose the gain made in other respects, and has continued to improve since. I do not, however, know the history of her weight after leaving the Asylum.

On the other hand there have been quite a number of cases where the improvement has been not only real but very striking, with but little, if any, increase in weight, and this too when the original weight was below normal.

Of course in cases in which the chief severity of the symptoms consists in digestive derangements the gain of weight is especially encouraging.

It is not only practically true but theoretically reasonable that the building up of all the tissues as indicated by body weight, although a most excellent, and in many cases essential, preparation for nervous repair, should not be all that is needful. The molecule of nervous protoplasm is undoubtedly a most complex one. It is the most delicate, most choice and precious of all living matter, and it is not to be built up by the same gross processes which turn starch and sugar into fat, or even gluten into blood-albumen.

Intellect, feeling, courage and will are not to be expressed in terms of potatoes or eggs or phosphates, even "vitalized," or alcohol or coffee.

The neuron is a growth, a structure, with its periods of increase and decay, and it is a view which leads to imperfect practical results to look upon it simply as a reservoir in

which energy can be stored up at will by a mere outside pressure of nutritive material.

It is undoubtedly true that every nerve process has its equivalent in a chemical decomposition, but it is not possible to reverse the process and make chemical, electric or any other force into nerve action at will, any more than it is possible to make the whole of the mechanical energy of a pound of coal into light without the greater portion of it going inevitably to less subtle and less desirable forms of force. The most that can be done is to present an abundant supply of material from which the nerve cell must select and build up according to its own law of growth.

I have no doubt that in many cases where we see a parallel improvement in weight and in general recovery of nervous tone that the general nutrition is favorably influenced by the restored function of the trophic nerves in stimulating secretion and growth, quite as much as because an excess of nutriment has been presented to the nervous centres.

People generally grow fat because they have ceased to worry quite as much as they grow cheerful because they have become corpulent.

Cæsar says indeed:

> "Let me have men about me that are fat,
> Sleek-headed men and such as sleep o' nights:
> Yond' Cassius hath a lean and hungry look:
> He thinks too much: such men are dangerous."

But the Scripture has it (Deuteronomy, xxxii. 15):

"But Jeshurun waxed fat and kicked: thou art waxen fat, thou art grown thick, thou art covered with fatness: then he forsook God which made him, and lightly esteemed the Rock of his salvation."

If we exclude the distinct hysterical element for which numberless theories have been framed, it is by no means easy to make one which shall cover all the cases in which

nervous exhaustion seems to play the principal part, and the chief difficulty appears to lie in those not very rare cases where the assignable or assigned cause is entirely inadequate to the effect claimed, and yet where the result is approximately the same as when the exhaustion is the legitimate consequence of actual and excessive overwork and anxiety, or overwhelming shock.

We can understand why successive, perhaps unexpected, deaths of near friends, perhaps after an exhausting period of nursing, should produce a complete temporary loss of mental vigor, and an absolute inability for action or decision, as well as many disturbances of the nutritive functions; but when a somewhat similar condition is supposed to remain for many years after the peaceful death of a parent at a good old age, except by assuming that immensely greater differences exist in nervous susceptibility of different persons than can be detected in regard to ordinary diseases, it is difficult to make the same anatomical explanation cover both cases.

We have now accurate anatomical descriptions by Hodge and his successors in the work, of the appearance of exhausted nerve cells under the microscope, showing that they undergo decided changes after rest and action identical with those to be seen in other cells, those of the stomach for instance, when in a state of functional activity or the reverse.

The condition of permanent exhaustion has not, to be sure, been directly observed in the same way, and it is doubtful if it ever will be, since the changes are of a too delicate kind to be preserved for hours after death, while, experimentally, it would be difficult to imagine a method of imitating the kind of constant irritation which brings about this condition in our own species.

Perhaps the victims of the abominable experiments of Mantegazza might have furnished material at a price infinitely beyond any possible advantage from such refined cruelty.

The nearest approach is perhaps to be found in the lesions of chronic insanity, which are, however, even now not clearly ascertained, except in general paralysis, where they are, as you know, of a more fixed, and probably of a more obvious, character. In the latter disease, we have, in a large proportion of cases at least, toxic and diathetic causes at work, in addition to the simple chronic congestion of over-excitement.

As I have already suggested, it is doubtful if the lower races, and even certain classes in civilized society, have the structure which fits them for the undesirable privilege of "nervous prostration." It has sometimes seemed as if that objectionable, but indispensable, phrase were used with a slight savor of pride, as if like gout, a liability thereto testified to a sort of mental superiority, or even a more advanced social standing.

Probably more than one generation may be required for its full development.

Heredity cannot easily be traced statistically, for the reason of the indefiniteness of the terms in which we describe and distinguish the nervous susceptibility, and also the controlling influence of personal feeling and theory in the testimony of relatives; but no one can deny its great importance, even if it is impossible to put it in figures. The difference in susceptibility, congenital or acquired in the early years of life, is the only way in which we can reach anything like an explanation of the great differences in the magnitude and effectiveness of the exciting cause of nervous breakdown. It seems necessary to assume a much greater variation than exists in regard to most bodily qualifications. No man is twice as tall and very few half as tall as the average, but it seems as if we should be obliged to express nervous endurance in terms of tens and hundreds, if we could measure it in figures at all, in order to cover the possibilities of the strain under which it is likely to give way.

Whether this difference depends upon complication and delicacy of nervous arrangement, or whether it is simply a matter of the mass of protoplasm or of nuclein, or whether, which is much the more probable, it resides in a recuperative power which is not expressible anatomically, is a question impossible to answer. Practically, nervous resistance is undoubtedly somewhat increased by the best general nutrition and very distinctly impaired by the reverse, but the extent to which it can be built up in advance by general nutrition is probably not very great.

Deficient and impaired nutrition of long duration may render permanent a stunted or misdirected nervous growth that might under more favorable circumstances have become normal.

Intellectual occupations, that is those involving a cerebral activity above the average, will undoubtedly contribute the larger number of nervous invalids (always however leaving out the hysterical), but it is not of so much consequence what the kind of labor is or how high a grade of intellect is involved, provided there is no undue susceptibility and also that the conditions under which it is done are not unfavorable. This implies of course that the labor should be fitted to the capacity of the individual.

The institutions for the higher education of men or women show no undue proportion of nervous breakdown, and it is just as easy to find typical examples among teachers and scholars in the public schools of lower grade, where the purely mental strain is probably no greater, or at any rate the intellectual results are no more valuable, but yet the conditions are of a distinctly worse kind, in the multiplicity of the exactions, the utter want of adaptation to individual capacity, and probably, worst of all, the unhealthy stimulus under which it is done. A patient whom I knew fifteen or more years ago, before she came to the Adams Asylum, used to date her final breakdown to a school essay on the

Geneva conference, none of the original participators in which, whose opinions were presumably quite as carefully and laboriously formed, seem to have shared the same fate.

It is probably unnecessary for me to remind you of what public school teachers are supposed to know, but the following list was obtained from a girl of twenty-four who was teaching up to a day or two before her entrance :—Geography, arithmetic, reading, writing, drawing, music, composition, a little grammar, orthography, gymnastics, zoölogy, botany, a little geology and mineralogy, physiology, which very interestingly was made to include hygeine (mental?) and the use of intoxicating liquors. Latin, French and German I understood to have been just introduced into the course, perhaps by way of diversion after hours. Whether she went to a party or two during the week I did not learn, or a bible class Sundays, but I find in my notes "four supervisors' meetings per week," which it is easy to imagine were not occasions of unalloyed happiness.

The influence which converts healthy fatigue into a pathological condition, too often permanent, is the stress and worry under which work is done, and in this way occupations which involve no harmful amount of intellectual labor come to have disastrous results. This is why teachers and students furnish so large a proportion of our patients, and why those that have "no occupation" surpass them. "No occupation" is likely to mean a dozen different ones, for none of which has the person any special aptitude. It is not the work done, but the driving.

They study, not to know something, but to pass an examination on it; not because they are interested in it but because some one else has studied it and it is a good thing to do, and they do not wish to be left behind; not because the girl cares anything about Greek, but because Greek has been taken as a sort of standard for so-called scholarship in boys and she wishes to glorify her sex and show the world that girls can do anything that boys can.

Such cases, however, are the less serious as being more frequently and more easily avoidable. In by far the greater number which we see, the element which changes physiology to pathology is not so easily got rid of. Household and business cares never relaxing, anxious work with no holidays, often two kinds of work, the worry of the schoolroom exchanged only for the worry of an invalid's sick room, or for the preparation for new examinations to retain the old places or to secure the necessary promotion.

Bodily fatigue, if taken not in the form of exhilarating out-door exercise but involved in the daily occupation itself, like continuous standing or working a machine, is a potent adjuvant.

All sorts of combinations can be imagined, but the one essential condition is worry and drive. To the fortunate individuals who do not allow things to worry them; who let their creditors walk the floor, instead of doing it themselves, when the note is coming due; whose business is done when they shut up their books for the night; who shed all their own and their neighbors' troubles as the duck sheds water, brain work is as healthy as any; but those people are rare. The New-England woman who is undertaking, with perhaps insufficient equipment, a career just a little beyond her real mental strength, which she must follow for her daily bread, or driven there by a social ambition, which is no unimportant factor in such cases, or even by the proverbial "conscience," is in a dangerous position. If you will pardon the phrase, which I have no doubt is already in your minds, when she has "bit off more than she can chaw," her danger of nervous dyspepsia, both in the literal and figurative sense, is very great.

Such cases are not difficult to understand or to deal with in their earlier stages, but they may, by their persistence and neglect at that time, by obstinate fighting against the weariness which is nature's call for a halt, get into a less manageable form.

We do not know of an anatomical condition of the nervous centres akin to distorted bones and ligaments, but the comparison is not a forced one when we find mental and moral distortion growing out of such cases and restorable with difficulty if at all, just as an inflamed joint becomes anchylosed or a stoop or twist or callus becomes fixed and irremediable. The neuron is a growth, a structure, and not a mere reservoir, and it is possible that those delicate networks which induce the action of other and yet other cells, so delicate that until a very few years ago no one had even suspected their existence, may be just as confirmed in their abnormal connections as if they were bones.

It is not impossible that we may one day see the growing sclerosis of the intellectual centres as we do that of the spinal cord, or recognize under the microscope that ideas have been so long centred upon self and suffering that it is as impossible for them to take any other course as it is for the electric fluid to go through a bad conductor to do useful work after it has established a short circuit in another direction.

Attention constantly turned in upon its own painful surroundings impedes healthy mental action as an ingrowing toe-nail impedes healthy locomotion.

We have then, as the simplest form of invalidism, the chronic neurasthenic, not perhaps melancholy or unhappy, but sensitive, self-observant if not selfish (and how indignantly would she repel this insinuation), hypochondriac, and useless.

A very curious and important variety of this class is one which seems to have etiologically no connection therewith, but which, when it progresses, shows so many common features that we cannot help acknowledging a close relationship between them. This is the invalid with nothing to do, and who requires a household to help her do it. She has had no hardships, she has studied moderately at school, and

perhaps has had a fall or an acute sickness, but she does not convalesce beyond a certain point, and is, or thinks she is, as helpless as the other. She is apt to think that all she wants is "rest," when she has never done anything that ought to tire her, and has done nothing but rest for years.

If we apply to the nervous end of the motor apparatus certain well-known principles which are familiar enough in the pathology of muscle, the paradox diminishes. Muscular atrophy from overwork is recognized, and often persists when the over-use is discontinued. The "writer's cramp" is a not altogether dissimilar condition. On the other hand, we have the atrophy from disuse, as in the limb kept too long in splints.

The same sort of judgment that is needed to know when the passive and active motion of an injured limb should be begun must decide when nervous rest should give way to exercise of the will.

It is when a fixed idea has grown and flourished upon the soil of neurasthenia that we get the most thorough going and confirmed invalidism. This fixed idea may be of gradual growth from long habit or a more rapid one from shock, forming the centre around which revolves the whole thought and being of the patient. On the other hand, according to the language now employed in the analysis of hysterical and hypnotic phenomena, it may reside in the subliminal consciousness, controlling thought and emotion without rising into the level of the patient's ordinary knowledge, and to be best discovered and combatted by means of hypnotism.

Here we find the hysterical neuroses, the anæsthesias, the paralyses and contractures, the obstinate vomitings, the neuralgias and aphonias of the severer and more chronic types.

We meet here even actual organic changes in the form of muscular wasting, stiffening of joints and muscles, not yielding permanently to passive motion or temporarily to anæsthetics. Perhaps even scleroses may be developed.

Whatever may be the anatomical and clinical changes in nervous structure resulting from long disease or the dominion of the fixed idea, there is little doubt, clinically speaking, that some influence may, after a time, render the lesion as permanent as if it were of the most pronounced and organic character. As tersely expressed by a witty friend, "nervous protoplasm is endowed with a long memory."

At what period this takes place and after how long a time, we can only approximately judge in cases where some part affected is accessible to vision and manipulation, as in the case of contracted limbs, or by the electrical reactions and the conditions of the reflexes.

It is perhaps a somewhat rash assumption to infer that psychic lesions and those of the limbs under their influence run parallel to each other, but actual trial is the only trustworthy test in either case, and it is, of course, much easier to apply in the latter condition. Where skilful and assiduous massage and passive motion fail for months to produce any return of flexibility to joints or strength to muscles, it is highly probable that the psychic condition will be found equally obdurate. In one case, where the massage of stiffened and resisting limbs was successful, and after a time the patient became able to walk, it seemed to me that the obstacle in the nerve centres was quite as great as in the limbs, and certainly much longer lasting.

The point, expressed in anatomical language, is to know how far in the first place the paths of conduction from motor centre to muscle are intact, how far there is simply enfeeblement of the centre, and lastly how far an apparent enfeeblement is counterfeited by inhibitory impulses from other cerebral centres, and in particular such as are controlled by the subliminal consciousness or a fixed idea. In other words, how far the motionless limb is actually paralyzed, how far the patient cannot will to move it, and how far she thinks she cannot move it.

The influence of shock, not in the surgical sense, nor meaning concussion of the nervous centres, is of great importance. Not a few of our patients refer their ultimate breakdown, usually not as the whole cause but the determining one, to a mental shock, frequently, for instance, the sudden death of a friend. It seems capable of taking the place of much chronic cause of depression, and, where the conditions are such as to receive and emphasize its full effect, to be as permanent in its action as the slower forms.

The question of real and visible lesion in the so-called "traumatic neurosis" and the relation of mental shock to physical concussion in such cases has been much discussed. If, as shown by Hodge and others, constant slight irritation produces organic and visible changes in the nerve cell to which it is transmitted, it is reasonable to suppose that an extreme but short series of irritations may do something similar without the intervention of any gross lesion whatever. Railroad cases are almost certain to be complicated in this respect, for it is almost impossible to exclude the influence of both mental and bodily shock.

The clinical manifestations of a purely psychic shock are, however, manifested as clearly and sharply as can well be imagined in a case reported by Dr. Jelly in the *Boston Medical and Surgical Journal*.

A man, previously healthy and temperate, fell, without losing his consciousness, on the track in front of a rapidly approaching train. He was practically uninjured and managed to roll quickly off to one side, so that the express train passed close to him without touching. This man lost his speech for many days, and for months manifested the most extreme form of nervous prostration and hysteria, with special dread, as is not to be wondered at, of anything connected with the sight or sound of railroads.

A somewhat similar case is reported by Derode, *Arch. de Neurol.*, March, 1895. A girl was barely rescued from

death by a train, but without injury. Loss of consciousness, hysteria and melancholia. Experts called it traumatic neurosis, hysteriform, probably incurable. But there was no trauma except psychic.

We find in the history of our 1000 cases, shock mentioned sixty times, and accident no less than one hundred and nine. In a large proportion of the latter a fall is specified, and not unfrequently a fall upon the back.

It is true that it was not always claimed that the fall was the only, or even the chief cause of the nervous condition, but it frequently occupied a very prominent position in the patient's mind. Only a very few of these accidents seem to have been severe, and in fewer still was there any question of damages, so that the element of "expectant pecuniosity," as it has been pithily called, was not in them at all. But for all this the fall was undoubtedly a factor in the psychic condition of the patient, and although the hope of damages may, in appropriate cases, undoubtedly be a hindrance to recovery, it has had very little importance with us.

A victim of the "Bussey bridge" disaster, who, as in so many cases, was able to walk some distance immediately afterward and lost strength only after some hours, came to us the second time long after damages had been finally settled, and yet in a condition of partial paraplegia which was supposed to be, and from the rapid improvement evidently was, of a purely functional character.

In all probability nine tenths of these falls would have been utterly without significance in persons of normal psychic stability, while, occurring in those having the hysterical diathesis, congenital or acquired, a nervous over-impressionability, they form a very important factor in making the chronic invalid of the quiet but pronounced type.

Melancholia should hardly be included in our scheme of chronic invalidism, not of course because a melancholic is not an invalid and a very serious one at that, but because it

is something more and also something less; more as regards the immediate severity of the symptoms, which often brings it distinctly into the class of insanity and less in regard to its average chronicity. I cannot agree with my learned and philosophical predecessor and friend, Dr. Edward Cowles, in considering melancholia merely a further development of neurasthenia, although there are certainly very close connections between the former and the acuter form of the latter; and although it must be acknowledged that neurasthenia may put on the melancholic type.

Melancholia seems more like a self-limited disease with a beginning, a middle, and an end; although, of course, like other self-limited diseases, it may in unfavorable cases run into a chronic condition.

Neurasthenia has a beginning and a middle distinctly enough, but a vague and uncertain ending. I believe the statement to be a sound one that the prognosis of neurasthenia is unfavorable, not in proportion to the apparent severity of the symptoms, but in proportion to the time during which they have been present.

Melancholia appears to fit much more easily into an autointoxication theory, possibly of intestinal origin, than the milder, more chronic, but more obstinate hysteroneurasthenia, with its more purely psychic origin.

One of the remarkable points about some of the most typical melancholias, which makes a highly important distinction from neurasthenia, is their absolute causelessness, so far as can with the utmost care be discerned, in the environment. It is seen in those who have not a visible care in the world and from whom no enquiry can elicit a trace of secret sorrow. In the acuter forms of neurasthenia the apparent cause is usually simple and more nearly adequate, in proportion, that is, to the resisting power of the particular nervous system in question.

Some years ago I saw a man who had just been taking

a trip abroad for a profound and causeless depression for which he found no relief. He assisted in detailing the circumstances of his life. Of excellent habits, irreproachable reputation, freedom from pecuniary trouble, with a steady occupation involving no overwhelming responsibility, and in which his employers allowed him to take his own course, some literary employment which gave him much or little to do as he liked, he pointed out to me the blessings he enjoyed of an excellent and exemplary family to whom he was devotedly attached, a pleasant residence and other material sources of happiness with which he was surrounded. Yet in three days after this conversation he knelt down in front of an express train.

The typical neurasthenic invalid does not kill herself.

If it were possible to devise a scheme for promptly and infallibly restoring the chronic nervous invalid to working power or even to the point where she would no longer be a burden, the benefit to the community would be somewhat like that which comes from diminishing the cases of phthisis or typhoid in adding to the effective working force of the world and diminishing the amount of non-effective labor. The invalid is likely to belong to a class, to be of the time of life and possess the mental capacity to make her working ability of great importance to her friends and the community. Her restoration to usefulness makes life easier for herself and a circle around her. I am not of those who can see in a multitude of beautiful examples and teachers of patience a sufficient recompense for the suffering, and waste of life and opportunities. Involuntary teachers of patience are useful up to a certain point, and I think they will never fail; but that profession is overcrowded with those who can never do anything else and calls for no amateurs. The deficiency is not in teachers but in scholars. What is of quite as much importance is that some of the most distinguished professors of this branch of instruction do not do it well.

Patience under afflictions which can be removed is no virtue, and the "sweet sufferer" does not elevate the moral tone of the neighborhood so much as might be supposed, especially when it begins to doubt the genuineness of the specimen exhibited as an object lesson.

It may be supposed from much that has been said that fattening and blood making are not always sufficient for a cure, a fact already familiar. We have seen the invalid who is fat and florid, and, on the other hand, the thin and apparently anemic doing useful and trying work without breaking down. If the circulation can carry a limited amount of healthy blood from the digestive organs to a healthy brain it will do the work, even if the mass be small and it does not brighten the cheeks or stop on the way to deposit adipose tissue. It is another case of the nimble sixpence better than the slow shilling.

Still it is undoubtedly better to have the soundest, most substantial and securest foundation to build upon. Business can be done upon a small capital, but it is more secure from accidents upon an ample one. We are not to neglect or look with indifference upon the building up, so far as possible, of the general nutrition. In fact we can look for little success when there is an absolute failure, and not merely an apparent partial one, in this respect. Except the improvement of essential symptoms which we are seeking to remedy, there is no other one test of success which is so trustworthy as a gain in weight; and it may precede the others. Only one need not be utterly discouraged if the gain is not a very striking one.

The general nutrition is one of the handles to raise the patient from her condition of invalidism, and it is the easiest to get hold of. Unfortunately one handle is apt not to be enough.

Corresponding to the feeding should be suitable attention to the excretory organs, and for this purpose one soon

has to become familiar with the whole range of laxatives, no matter how advanced his theoretical views as to the treatment of constipation by diet, electricity and massage. An occasional old-fashioned mercurial is not to be despised. Nitrogenous elimination is to be promoted by the use of water, sometimes slightly alkaline, though this is not usually of great consequence.

To think of rest as a new discovery for the cure of fatigue would be equally ingenious with inventing a food cure for hunger, but, for all the apparent simplicity, mistakes are possible in the application of both remedies.

If we consider again the physiology of fatigue and repair, as shown in the nerve cell, which we may regard as the differential of that highly complicated function cerebral activity, we find that it is a matter of a few hours, so that in the birds, for instance, which were examined by Hodge, it was embraced within the limits of day and night. Although we know very well that human cerebral activity may continue much longer under special excitement, there has never been the least reason to doubt that this diurnal period is the least exhausting, as it has always been the usual and natural one.

Even a shorter period has its advantages especially in the way of prevention. The American business man's hurried lunch might well be developed into the usual dignified siesta of hot countries.

We cannot be too firmly convinced that the nerve cell is a living growth and not a mere reservoir. The figure of speech often made use of in describing the origin of neurasthenia, *i.e.* as a bank account constantly drawn upon without corresponding deposits, is an extremely erroneous one in the respect of implying that, no matter how low the amount may go, it can be set right again at once by a single sufficient sum. This is certainly not true of nervous exhaustion in the more chronic forms.

The neuron has two functions or modes of action; one is to originate and transmit stimuli either to a muscle or to another neuron, and the second to maintain its own capacity for the conversion of energy. The first of these is necessarily carried on at the expense of energy, with definite chemical changes, but the second is a more subtle inherent property dependent on heredity, education, and many other influences, the diminution of which is purely pathological.

Too great a prolongation of the period of fatigue, too many and too unremitting repetitions of the slight irritation, a shock too great for the normal reaction, produce not only a drain of energy but more or less impairment of the capacity for reproduction, or an actual change in the habit of growth, so that it is no longer capable of being made whole, either by a full supply of nutritive material or simply a prolonged rest, equal to the period of fatigue. If we wished again to resort to the business simile we might compare the nervous system not to a bank account, but to a manufacturing establishment where the demand for its products and for dividends has been so great that nothing has been spent to replace the worn-out machinery, and it has finally come to a forced standstill. Then, not only money but time and labor must be spent to get it into working order again.

We know that healthy function is not restored by rest alone. We do not expect to bring back motion to the paralyzed limb by putting it in a starched bandage; and activity is to be restored to the disused neuron by gentle and increasing exercise, just as it always is to the disabled muscle. The point at which this is to be begun is the point where the judgment of the physician is needed. Perhaps in the future some of the tests of the psychological laboratory may give us a more definite stand point.

How common it is for a patient of this class to tell us

how she has been set back by what she considers premature attempts to get up and do something, and, on the other hand, how often does the suspicion arise that what is supposed to be profound exhaustion comes extremely near to indolence, fear, habit, and want of confidence. One is often obliged to defer somewhat to the views of the patient and her friends and proceed with more timidity than his own fears would dictate. Delay and caution may be called for, not because there is real danger, but because it is necessary to establish a relation of confidence with the patient, and avoid the suspicion of rashness.

The question of sleep covers a good deal of the same ground as that of rest, but not the whole. It is not unusual to meet with patients who get a very fair proportion of sleep in the twenty-four hours and are yet incapable of mental effort during the remainder. In others it seems that the return of sleep is much more a consequence and sign of returning nervous vigor than simply a means of establishing it. Without it we can hardly hope for a sound recovery, but it does not follow that because the normal daily expenditure of nerve force can be completely made up by the nightly rest, or even that of two or three days, that the accumulated deficiency of a year can be made up by a corresponding number of extra hours. The nerve cells have not only expended their energy as fast as produced but have lost the capacity for storage.

What has just been said applies chiefly to the plain and simple forms of nervous exhaustion. The case is different when the fixed idea, conscious or unconscious, is added: when the machine has not only its driving force diminished but when some foreign body blocks the wheels.

Feeding and rest cannot always, perhaps I might almost say can never alone, dislodge this. It is probable that general nervous depression favors the domination of the fixed idea just as under-feeding does infection by acute

febrile disease, and undoubtedly a restoration of general health and strength is of great advantage in the one case as in the other. Sometimes it is the only thing which can make a complete cure possible, but a nervous warp or twist may be as obstinate as one involving bone and ligament. We see this in the most striking way in inherited mental traits which are as permanent and distinct as features, color, size, or disease tendencies. Insanity breeds as true as phthisis and more so. Acquired tendencies are, indeed, often much less permanent, but the fixed idea is not the same thing as a whim of the imagination.

The psychic element in invalidism is to be controlled by psychic means.

We find among those who have been with us and who have been discharged without complete or permanent relief, no inconsiderable number who refer their recovery, or what they consider as such, to some one of the many forms of empirical treatment, now so much in vogue under names familiar to you all, which have, like other fads before them, been erected by their cultivators into a kind of religion. I do not suppose that our inquiries have resulted in anything like a complete account of these cases. We have known of some who have not reported themselves, a few have stated that they tried so and so with no good result, and it would not be human nature if the favorable cases were not more readily reported than the unfavorable ones. Such things have happened in more scientific circles. Making all allowances, however, I think it is well to look the fact squarely in the face that some persons do receive great benefit from some of these forms of treatment who have failed to do so at the hands of regular and skilful practitioners. These cases should be studied and not contemptuously waved aside. *Fas est et ab hoste doceri.*

Presumably most of us believe that the days of miracles are over, and that these cases do not furnish any exceptions to the ordinary laws of mental physiology.

But we have not to look to these sects alone for cures of this character. They have been happening under all sorts of names and schemes. Besides those openly claimed as wonder cures it requires no great stretch of the imagination to suppose that many such attributed to this or that drug, spring, bath, or physician, have been of this character. They swarm, more or less well interpreted, in medical literature.

There are those, even among our neurological brethren, who hold that many of the good results of electrical treatment, especially by the static current, are largely due to their psychic influence.

Notorious practitioners have removed fictitious tumors and opened abscesses for which they had themselves to provide the pus, charging extortionate fees in order to keep up the "moral" effect. Medical and religious history abounds with the records of cures made by appeals to the faith and imagination in all sorts of ways, and it is generally well recognized that they are wrought largely in the class of cases we are now discussing.

It is not, however, a very dignified position for a physician to occupy when he makes such explanations for the first time for the purpose of belittling some cure of the kind which has been reported to him. They are probably perfectly correct, but, when brought forward at such a time, they lay him open to the very obvious retort: "Well, if you knew all about it why did not you get the same result?" or, "Why did you wait for somebody else to make a cure before you made a diagnosis?" Such questions as these we should ask ourselves with calm judgment rather than wait to have them asked of us sarcastically at a time when the true answer cannot be looked upon otherwise than as a mere excuse for failure.

The answer is twofold. First and foremost, physicians ARE constantly doing the same thing consciously or uncon-

sciously. They always have done it since there were physicians, and always will, no matter what the changes of pathological and therapeutic theories. The physician is not likely, like some politicians, to ostentatiously parade "personal magnetism" as a portion of his outfit, but he may have it, and it is undoubtedly true that, other things being equal, he who possesses the complete confidence of his patient will have the best results, without reference to the subordinate consideration that the patient will follow his directions most carefully.

This fact is sufficiently well recognized, but, for the very reason that it is every day and commonplace, it is frequently lost sight of. If an invalid recovers under the care of her trusted family physician her friends are satisfied indeed, but not astonished. It is not heralded through the sewing circles, the social calls and the confidential chat as a wonderful event. It was the doctor's business to cure her and he did. Good doctor, but no miracle about it. If, however, the case does not go so favorably; if he fails to impress her imagination, being nothing but a plain, common-sense practitioner, with no halo of specialism, no romance, no slight uncanny flavor about him, and she then goes to a miracle-monger and recovers, the case is very different.

Let me briefly mention three illustrative cases: One of the earliest patients of the Adams Asylum, in answer to our inquiries, attributes her cure, which has been a permanent one, to "mental healing," but further describes the process as having been convinced by the physician of the Asylum that the organic disease of the stomach, which she was sure existed, was not real.

A second convinced herself that the promises of the Bible as to cure by faith were made to her, just as well directly, as through the hands of any other person. She had faith and was made whole. Her own account of the case was published and she has been a useful woman for many years.

The third suffered, with a perfectly serene countenance, excruciating pain. I find that she was discharged "relieved," but she went to another institution where a person, at that time well known, prayed, laid his hands upon her, and she got up and walked. The case obtained considerable newspaper notoriety at the time and the patient became an apostle. She, however, now thinks that a year's rest at the asylum would do her much good.

The physician possesses the advantage over the charlatan of a knowledge of pathology and diagnosis. The charlatan possesses the advantage over the physician of ignorance of exactly the same things. The air of confidence is a very subtle one and the perceptions of the patient acute. She is apt to know well whether the physician is telling her what he fully and firmly believes himself, or whether he is making some mental reserve, and his influence is controlling or the reverse accordingly. How can he assure a patient that her vomiting is purely nervous when the faint suspicion lurks in his mind that his encouragement may be interrupted by a hemorrhage or perforation, or tell her that her headache, though painful, is not dangerous, when the next hour may reveal to him a double optic neuritis? The curist knows or cares nothing about these possibilities, and the corresponding confidence in his voice and bearing are tempered by no hesitation or reserve. He may also steal from his rival, and get a working diagnosis ready made.

The patient who has gone from one physician to another and another seeking relief from symptoms which get no better and no worse, for which no organic cause can be found, may be shrewdly suspected to belong to this class; or at least the charlatan can do no worse than his learned and distinguished predecessors, even if he fail; while, if he give assurances stronger than their knowledge of pathological possibilities allowed them to do, he may accomplish that for which they only paved the way.

Why one person should have this effect more than another it is indeed difficult to say, but no more so than in many other situations where personal influence seems to rest on anything but the reasonable foundations that one would naturally expect.

A former patient, a bright, intelligent girl, suffered after her discharge from constipation as she had done before. After trying various persons she at last settled upon one practitioner of a popular fad as the one for her.

"What does she do?" she was asked.

"Oh, she sits and looks out into space."

"And what do you do?"

"Oh, I sit and look out into space. Then I go home and have a movement of the bowels; but I can't do it alone."

There is no reason to suppose, however, that this influence is of any extraordinary character. There is nothing in these psychic therapeutics to induce a belief in any communication of nervous force or in any telepathy. The influence undoubtedly reaches the nerve centres of the patient through the ordinary channels of the senses, and the recuperative force just as undoubtedly originates there. It is simply set free by an external stimulus, or else the opposing inhibitory force of the fixed idea is removed.

There is no doubt that the peristaltic activity of the intestines is under nervous control, and that there is a continuous connection of the local plexuses with the highest nerve centres. Yet we are only too well aware that no amount of reasoning on the propriety of setting that mechanism in action, and no amount of firmness of intellectual conviction is sufficient to produce the desired result; but we know that habit, without conscious cerebral action, sets the apparatus in motion, and also that an unusual cerebral impression entirely disconnected with any idea of intestinal action, like fear for instance, may do so.

It appears necessary that the influence which is to promote such a psychic change as must take place in cases of hysteria and consequently in many of chronic invalidism, that which is to make the cerebral hemispheres again resume their control of the muscles, which is not merely to diminish the extreme sensitiveness to pain and fatigue, but inhibit that active search for it so commonly seen; that which is to set flowing again that nervous current which promotes nutrition; in a word that influence which cures, whether in the hands of the physician who has studied the case and who knows it scientifically, or of the charlatan who makes no pretence to such knowledge or shrewdly guesses at it from the failures of his predecessors, must reach that psychical region that is not in full view of the ordinary consciousness, the so-called subliminal consciousness.

It is apparently in some lower stratum of cerebral action that intellectual convictions are moulded into confidence, desire and activity, and there also apparently the same convictions may arise without the intervention of distinct perception or logical reasoning. There are those who hold that this region may be reached most quickly and certainly through hypnotism, *i.e.* the patient is made more receptive and suggestible thereby. We have seen how it is reached by methods which have but little to do with the reason, and much with mystery and marvel. It is certain, however, that these are not the *only* channels through which an impression can be made, and it seems probable that when the physician, by beginning with the ordinary consciousness and by oft-repeated direction and encouragement, sometimes amounting to a re-education, can stimulate the motor powers of the will and set them free from the inhibitory control of fear, habit and hypochondrical delusions, the result is quite as complete and permanent a one. This comparison, in my relative inexperience with other methods, I make with considerable diffidence.

Different persons in their normal mind vary immensely as to their persuadibility and reasonableness, and the hypnotists recognize as well the same distinction in the susceptibility to their influence. It is probable that the two qualities are closely allied if not the same, and it seems not only reasonable but strictly in accordance with observed facts to suppose one avenue of approach more practicable in one set of cases and another in another.

A firm conviction, unreasonable, unaccountable, absurd, even almost unacknowledged by the patient, is a more powerful moving force than an intellectual conclusion, no matter how soundly based upon facts and logically constructed, but if the one can be made to support the other, no matter which goes first, we have a more active and constant force than either alone can give. The learned and skilful physician can argue with his patient that having no organic disease and having thoroughly rested, she ought to get well. If he can make her thoroughly believe it she will get well, but if only half persuaded that she is going to do so, it may require the mysteries of some patent cure, perhaps in the hands of an ignoramus (and more effective for that very reason), something which impresses the feelings as well as the intellect, which soaks into the lower stratum of consciousness, to complete the work and give that little shock which shall start the machinery already in working order but motionless.

Many of the agencies of the simplest character in use in the treatment of nervous invalidism are of value, not so much because they actually contribute strength, as because they convince the patient that she already has it. Gymnastics are of quite as much value because they oblige her to take a definite initiative without hesitation and on order, which massage and electricity do not do, as because they increase muscular strength. They undoubtedly do good by promoting muscular development, but they do at least

as much by convincing the patient that she can herself move her muscles with ease.

There is often no more obstructive frame of mind on the part of a patient than a highly logical and intelligent one, or, better, the belief that she has such a one and the desire to exhibit it.

An argumentative patient can always have a reason ready, if she be inclined in that direction, why each thing that is ordered by her physician is exactly the wrong one for her, however well it may be adapted to those of ordinary mould.

As we all think,—

> "Whene'er we groan with ache or pain,—
> Some common ailment of the race,—
> Though doctors think the matter plain,—
> That ours is a peculiar case."

Pride in her own case is a sentiment which it is highly important to retain upon the side of the physician. If it take the form of an ill-concealed exultation over its difficulties and obscurity, or the patience with which sufferings are borne, the number and distinction of the physicians who have been consulted and their discomfiture therein, it is naturally a most unfavorable element. If she say in effect, "I defy you to cure me," she will probably be the victor. But if it move in the opposite direction and the patient, whether from her own usual mental condition or led by persuasion and personal influence, or some less commonplace motive, believe that she is standing on a higher mental or moral plane than her neighbors, or that her recovery is phenomenal, and that she is performing wonderful feats of strength and endurance, it is of the greatest value. She is your strongest ally.

Expectant attention is a very different, and for therapeutic purposes a much better thing than argumentative

and combative attention. In a receptive condition, either natural or induced, the truths of which the patient may have been previously intellectually convinced, assume a controlling position over the will and motor functions. The doctrine becomes a force.

Nervous invalidism is a psychosis, and the study of it is a branch of morbid psychology.

It is very possibly associated with actual changes of a chronic character in the neuron, analogous to those which have been found as the result of fatigue.

It is, to a considerable extent, the consequence of congenital conditions, or of heredity, *i.e.* of the transmission of an enfeebled or distorted nervous system.

On this basis the fully developed condition may be acquired at any time, though most easily in youth, either gradually or as the result of special strain or shock or acute disease.

It varies from pure nervous exhaustion on the one hand to pure hysteria and insanity on the other, but most chronic cases stand somewhere between the two extremes.

The foundation of a rational treatment is a diagnosis, a diagnosis by exclusion, not simply a recognition that the patient is weak, anemic, hysterical, and nervous, but a conviction so founded on a thorough examination, and so firm that it can be confidently imparted to the patient, that the symptoms do not depend upon structural disease of the organs with which they appear to be connected.

There are no organs which may not be involved, but by far the most commonly so, and calling for the most circumspection in diagnosis and care in treatment, are the pelvic and digestive.

On this foundation the treatment consists of three essentials, any one or two of which may take the lead in the individual case.

Food to furnish material for the growth of the neurons.

Rest to give time for them to appropriate it and to grow.

Mental and moral control, by stimulating healthy function, to restore their lost tone and activity.

ARTICLE XVII.

MODERN VIEWS OF THE NATURE AND TREATMENT OF EXOPHTHALMIC GOITRE.

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MODERN VIEWS OF THE NATURE AND TREATMENT OF EXOPHTHALMIC GOITRE.

The various problems connected with the origin and treatment of exophthalmic goitre, or Graves's disease, as we may justly call it, have long been and are long likely to be fascinating objects of speculation and research for the physician and the pathologist. Not only have the frequency of the affection and its resistance to ordinary methods of treatment, its striking and mysterious symptoms, its obscure relationship to so many other diseases of the nervous system, inspired the wish to probe its secrets deeper, but it has shared, to a considerable extent, in the lively interest which attaches to the recently discovered functions of the thyroid gland, and has thus attracted the attention of surgeons and physiologists in large measure.

Its literature has rolled up to an enormous pile; but, fortunately, it has been brought better within the reach of the ordinary student from having been carefully collated in a few exhaustive monographs published within the past year. Yet, so far are we from positive knowledge, that almost each one of the writers of these essays, all having the same facts before them, has a somewhat different theory to propose as to the nature of the malady.

I should hesitate then to bring before you a subject so confused, were it not for its intrinsic fascination, for the new and important observations, especially in the line of therapeutics, and for the fact that although we cannot arrive at positive conclusions, yet the very study of the problems involved is an instructive education.

The principal theories of the disease are three in number:

1. That it is due to localized lesions of the medulla oblongata.

2. That it is a neurosis.

3. That it is of toxic origin, and that the existence of the poison is in some way related to disease of the thyroid gland.

As our knowledge and our pathological and physiological conceptions widen, with the advance of time, it may appear that each of these views contains some part of the truth, and that what we need is the generalizing touch of some deeper student and more prophetic genius to unite them all.

1. It is almost imperative to admit that the medulla oblongata is in some way, directly or indirectly, involved, for in that rich and mysterious area lie the principal centres of cardiac activity and regulation, of the vaso-motor system, of the sympathetic nerves, the centres related to the digestion of sugar, and many more, while close by are grouped the centres for the ocular muscles.

This region is also, in a sense, an important emotional centre, for, remote as it is from the cerebral cortex, which is the sanctum of our higher interests, lesions of the medulla are very prone to give rise to emotional manifestations, and so a new relationship to Graves's disease is established. This is an important matter because it involves the principle that any influence which excites the bodily symptoms of an emotion is likely to excite the emotion itself.

Again, skilful investigators have actually succeeded, experimentally, in exciting, through mutilations and excitations of the medulla oblongata and the nerves that spring from it, some of the most typical symptoms of Graves's disease.

The objection to the medulla oblongata theory, in the sense in which it is generally upheld by its supporters, is, first, that it is not proved; second, that it is not probable. It

might even be said, strictly speaking, to be disproved, for although gross lesions have been found in the medulla in several cases—congestion, small hemorrhages, degeneration of the restiform body—they are neither uniform nor constant, and so are probably secondary, not primary.

Nutritional lesions there may well be, and finer methods of research may find them out, but we touch here upon the domain of the *neuroses*, and that introduces a new problem which we must consider later.

On general grounds the theory is improbable, because it is not adequate to explain the vast array of symptoms that claim our notice. There is no other disease of the medulla which gives rise to anything comparable. The *animus*, so to speak, which has led some pathologists to search for gross lesions in the medulla, though the search seemed to be so often in vain, has been the laudable desire to substitute the evidence of the senses for vague theory, and a sort of hatred of the term "neurosis," as meaning everything and nothing. But this feeling should not be allowed to entice us too far.

A good theory may be more useful than a partial observation of fact, and though we cannot yet define the term neurosis with complete satisfaction, we are surely in better position than ever before to look forward to the time when a good definition will be practicable, and to divine its scope.

2. But the theory which of late years has inspired the most wide-spread enthusiasm, is that which refers the symptoms of Graves's disease to a toxic cause, and assumes that the poison which gives rise to it is either formed in the thyroid gland or else, being formed in other tissues, gets into the circulation in a noxious form through lack of the supposed anti-toxic properties of the thyroid secretion. I may say in passing that this toxic theory is not the only thyroidal theory of Graves's disease. It has long been known that large goitres could cause, perhaps by irritation of the nerves in the neck, disorders of the heart's action, and even exophthalmus

and other symptoms of true Graves's disease. Usually the typical symptom-complex does not occur in these cases of so-called pseudo Graves's disease, though it is a matter for grave doubt whether the partial and secondary forms of the affection ought to be distinctly separated from the more complex and typical forms. In my opinion the local action of the goitre does often contribute a certain share to the clinical picture, in accordance with a principle which I will later endeavor to state, although it does not act as the whole cause of typical cases.

The merits of the toxic theory may be characterized as follows: It is, in the first place, entirely conceivable that the symptom-complex of Graves's might be, in one sense, of toxic origin. There is no more reason why this set of symptoms should not be called out by a poison having special chemical characters and affinities than that strychnia, atropine, or the toxic cause of myxœdema, if such be its cause, should produce their characteristic results. Cocaine, indeed, is said by Durdufy to produce symptoms in several respects resembling those of Graves's disease. It need not be even assumed that the disease of the thyroid is the first link of the chain. A disturbance of its innervation might conceivably be the influence which set the match to the train.

This toxic theory comes moreover at a good time for receiving favorable notice. "Toxic" is nowadays a good word to conjure by. The enormous impulse which bacteriological investigations and the study of ptomäines and leucomäines and nucleins, and the highly toxic substances generated in consequence of the removal of the supra-renal capsules and other glands, have given to the doctrine of the organic poisons, has lent to the term "poisoning" a wider meaning than it has ever held before. Men are now prepared to believe that anæmia is a toxic disease, and even that a large number of mental affections, and possibly even neurasthenia and hysteria, should be included in the same cate-

gory. Of course, in a sense, every change in nutrition of a morbid kind may be called toxic, and the only question is how far it is worth while to extend the term at present.

But while we may admit that the symptoms and pathological changes which underlie Graves's disease might conceivably be induced by a poison of some sort, it is another matter to furnish the proof that this occurs, or that the assumed poison is derived either directly or indirectly from the thyroid gland. The arguments which have been used in favor of this view are in the main the following:—

1. Many cases are now on record showing that Graves's disease may pass over into myxœdema, as the degenerative changes in the thyroid gland become more serious. Furthermore, myxœdema and Graves's disease may co-exist in the same family, and one or two instances are on record where the two diseases have existed side by side in the same individual (Sollier and others).

2. It has been noticed that when thyroid preparations are given to myxœdematous patients for therapeutic reasons, the pulse sometimes becomes rapid, and feverishness and loss of flesh, diarrhœa, and other symptoms of nervous excitability make their appearance, such as suggest the nervous erythism of Graves's disease, though so far as I know a typical picture of Graves's disease has never been produced in this way. Similarly, when thyroid preparations are given to persons in health, analogous results occasionally occur; and conversely, these preparations are usually not well borne by patients with Graves's disease. Again, in the first stage of the cachexia which follows the removal of the thyroid, tremors and tetany and other signs of nervous disturbance often make their appearance.

3. There is a certain contrast between the symptoms of Graves's disease and those of myxœdema, which at first sight seem very striking. This contrast is tersely expressed by Mœbius, who says: "In one case we have enlarge-

ment, in the other diminution in the size of the thyroid gland; in the one a rapid, in the other a slow heart beat; in the one we have a fine skin, warmer than usual and inclined to sweat, while in the other the skin is thick, cold and dry; on the one hand we see increased mental irritability, a condition of irritable weakness; on the other, slowness and dullness of mental action."

4. The urine in Graves's disease is much more toxic than that of health, though injections of it into animals do not give rise to the typical complex of Graves's disease.

5. Belladonna, which checks secretions and might be supposed to exert its action in case of the thyroid, has been thought by some observers to be of service in Graves's disease, though I have not found it to be so.

6. The excision of portions of the thyroid gland in Graves's disease is sometimes strikingly productive of relief to the symptoms, and the same may be said of other modes of treatment, such as electricity or injections of iodine, which are directed to diminish the size of the thyroid.

7. While it is generally held that *thyroid* preparations rather aggravate the symptoms of Graves's disease, several cases are now on record, indicating that preparations of the *thymus* have a very beneficial action in this same affection. It might perhaps be urged, though I do not remember to have seen the suggestion made, that the reason that young children are, as a rule, exempt from Graves's disease, is that the thymus persists in them for a considerable time.

8. The histological investigations of Greenfield and others have been held to indicate that the changes that occur in the thyroid gland in Graves's disease are such as would be likely to go with increased activity as a secreting organ.

On these and other grounds it is strongly held by many writers that the symptoms of Graves's disease are due to an excess of the thyroid secretion or to its being modified

in character. But interesting as these arguments are, a careful examination of them seems to me to show that the thyrodical secretion theory of Graves's disease is still extremely vague and lacks a sound basis.

The strongest argument in favor of the thyroidal theory is perhaps that drawn from the therapeutic action of thyroidectomy, and as that is a subject of great practical interest also, it is well worthy of your consideration.

In spite of the great attention which the surgical treatment of goitre in general has received for a very long period, it is only within a comparatively few years that thyroidectomy or kindred operations have been done in Graves's disease, if we except a few isolated cases. Two years ago I was able to collect only about fifty cases of such operations, but they have been multiplied with greater rapidity. Kocher, the surgeon of Berne, declares, in his recent and very valuable paper, that he alone has done over fifty such operations, out of a total of some two thousand goitre operations of all sorts. The operations have been practically of three kinds, partial thyroidectomy, ligature of the thyroid arteries—of which, according to Kocher, only three out of the four should be tied—and exposure of the gland by median incision (Jaboulaye), after which it is separated from its bed, and left, covered with an antiseptic dressing, to dry and shrink, between the lips of the open wound in the skin, the edges of which are stitched back. The results of all these operations, of which a ligature of the vessels is probably on the whole the best, have been very satisfactory, and there would be every reason for advising them in a given case, were it not that every now and then a death occurs for which no satisfactory reason can be found. I have recommended the operation myself in two cases, and it was skilfully carried out by Dr. J. C. Warren. One of the patients died on the eighth day after operation, though she was a young and healthy girl and the wound had been

doing perfectly well. The other patient lay at death's door for some days, but since then has been gradually though slowly improving, and now, at the end of two years, is able to say that she is much better than before the operation was done. During the first few days after she was operated upon Dr. Warren called my attention to the fact that a large quantity of thyroid secretion was escaping from the wound, and it occurred to us both that her serious prostration might be due to poisoning from this source. The same idea has suggested itself to others, and Kocher dwells on it at some length. He refers particularly to the fact that in one of the desicating operations à la Jaboulaye, to which I have referred, it was noted that the exposed surface of the gland sweated out a quantity of fluid which was presumably thyroid secretion. It is, however, difficult to see why, if this poisoning theory of these deaths is correct, they should not occur in a larger number of cases, nor why the fatal end should occur so suddenly when the patient had previously been doing so well, as happened, for example, in Dr. Warren's case, and in another described to me by a colleague in New York.

It is interesting to note that the improvement after operation sometimes takes place quite rapidly, sometimes very slowly.

But there are other methods besides thyroidectomy which, by acting on the gland itself, occasionally produce favorable results in Graves's disease, and so lend support to the thyroid theory. Such are the internal use of iodine, which has been revived in the clinics at Berne. The local use of electricity comes under the same category, especially when used by the method, which I believe to be the best one, of powerful and prolonged Faradic currents applied so as to literally squeeze out the contents of the gland. This method, which is a modification of those in earlier use, was first suggested, I think, by Dr. W. J. Morton of New

York, and in our hands at the Massachusetts General Hospital it has proved of real service.

In the same connection is, perhaps, to be mentioned the use of thyroid and thymus extracts.

Everyone is now aware that among the extraordinary results of feeding with thyroid extracts—results which embrace improvement in the nutrition of the skin and its appendages and the relief of obesity—it has been observed by v. Bruns, and now by many others, that the ordinary forms of parenchymatous goitre, especially in young persons, sometimes really melt away with great rapidity.

Occasionally, and in spite of the tendency to increase of the nervous symptoms under this influence, the same treatment leads to a diminution of the goitre in Graves's disease as well, and to an eventual improvement in the condition of the patient, a fact which is a blow to the excessive-thyroid-secretion theory of the disease.

Still more recently, Owen and Miculiez discovered that thymus extracts seem to be still more apt to relieve the symptoms of Graves's disease, though without necessarily causing any great reduction in the size of the gland. These observations are of great scientific and practical interest, but they are as yet too few in number to make it necessary to dwell upon them at length. [See a paper by Cunningham in the *Medical Record* of June 15, 1895; and an editorial in the *Boston Med. & Surg. Journal*, July 11, 1895.]

But in spite of the fascination of the thyroidal-poisoning theory of Graves's disease, and the high ability of the men who support it, it cannot be said to have as yet fully established itself, or not, at least, as the exclusive cause of the affection.

The theory has taken three forms:

a. That the thyroid secretion is secreted in excess;

b. That it is altered in character;

c. That it fails to neutralize other organic poisons formed in the course of general metabolism.

The arguments in support of each of these different views should be different, but the supporters of the general theory are too apt to select those parts of each which seem favorable and to apply them to the support of the general view, which thus escapes criticism by its vagueness. It can hardly be that an excess of thyroid secretion is the invariable cause of Graves's disease; for the nervous symptoms, especially the tachycardia, may begin years before any goitre is observable. It is true that even a normal sized goitre may possibly have a hypersecretion, yet it remains to be proved that it does so.

Again, as patients improve in their nervous symptoms the gain is by no means always proportionate to a diminution in the goitre, though usually it is so.

Finally, thyroid preparations do not always aggravate, but sometimes relieve the symptoms; and though Kocher suggests that this may be only when they act by diminishing the size of the goitre, yet the explanation is manufactured for the exigency and as yet lacks proof.

Neither is it probable that a *vitiation* of the thyroid secretion is the invariable cause. For the removal of a part of a morbid goitre should not cause this vitiated secretion of the rest to change its character; nor would the squeezing out of the vitiated contents of a diseased gland by strong Faradic currents be likely to relieve the symptons, at least without making them worse for a time, which does not happen. And if it is a vitiated secretion which is in play, then there is no special reason why the fact that the addition of a little more normal secretion, given therapeutically, makes the patient either better or worse, should count as an argument in favor of the view; nor ought the contrast between myxœdema and Graves's disease, which might, if well established, count in favor of the hypersecretion theory, be reckoned as an argument for a vitiated secretion or of some other non-neutralized poison of whose physiological action we know nothing.

Obviously, we must wait for further light before deciding. It has even been suggested that the enlargement of the thyroid may be a conservative effort on the part of the organism to secure an increased amount of secretion for nutritional purposes, and that it grows smaller under the influence of thyroid extracts given therapeutically, because these act as a substitute. This reasoning has been applied, to be sure, more especially to the case of the ordinary non-exophthalmic goitre, and the arguments in its favor are not forcible enough to command acceptance. It shows, however, the complex nature of the problem and the way in which theory runs loose in attempts to solve it.

Meantime, it must not be supposed that the only remedies of value are those which act directly on the thyroid gland. The time honored treatment by complete rest is still one of our best measures; and of new methods, Kocher himself, on the basis of observations made by his assistant, has advocated the use of sodium phospate, as diminishing the irritability of the nervous centres in the medulla.

We are trying it on a considerable number of patients now under treatment at the hospial, but cannot speak positively of the result.

3. Finally, it is imperative to say something of the "neurotic" theory of the disease, though the problem is so complex that I approach it with diffidence, the more so that I must condense into a few sentences an argument which should occupy a volume.

It is obvious that if satisfactory conception of this sort can be framed it would have the great advantage of bringing Graves's disease into line with the other members of the vast neuropathic family of diseases, the psychoses, the neuroses, the degenerative affections with which it is clinically so closely related.

The first question is, what do we mean by a neurosis? Is it a "functional" or an "organic" disease, to use the cur-

rent terms? In this connection, I would call attention to a valuable paper by Prof. Obersteiner of Vienna, published in the *Weiner Klin. Wochenschr.*, April 25, 1895, though I do not wholly agree with his reasoning or conclusions. Obersteiner points out, what is certainly true, that many conditions which have been called "functional," that is, have been supposed to be without anatomical basis, are being classed, thanks to our better methods of research, among the diseases of known pathology. At the same time, he believes that there are and probably always will be a certain number of affections, or symptoms (which may exist either independently of the so-called organic nervous diseases or in conjunction with them), having the peculiarity that they are due to a quasi-physiological disorder, if the expression may be allowed, of the higher functions of the brain; that they are in short allied to the psychoses. Many hysterical symptoms are of this character. This is a useful generalization and akin to the explanation which I have to offer, but should approach the problem in a somewhat different way.

Speaking broadly, one may divide the diseases of the nervous system into three principal classes: *a*, those where certain nerve elements degenerate, mainly because of inherent weakness; *b*, those dependent on a toxic cause or on impairment of the circulation, that is dependent in a general sense upon their blood supply; *c*, those which arise because from one or another cause the harmony which should exist between the different portions of the nervous system is broken. It is in this latter class I think that the neuroses belong, though I may say, in passing, that the same disease should often be classed under more than one heading, the classification here suggested being merely offered to show the different etiological tendencies which are at work.

Much needless discussion has been spent on the question

whether in the neuroses and psychoses there is any demonstrable change in the elements of the nervous system.

In one sense the answer is a simple one. The current terms, namely, are meaningless. There is no such thing as a functional disease of the nervous system, if by that is meant one that has no correlate in change of structure. Even fatigue leaves a mark in nerve-cells, which, as we may recognize with pride, a student of Clarke University, Mr. Hodge, was the first to note. The only sense, so far as I know, in which we may not expect to find a structural correlate for a manifestation of disordered function, is where the disorder is adopted, as it were, by the organism, so that it is no longer proper to speak of it as a disorder at all. It is not to be supposed, for example, that such a trick as biting one's finger-nails or scratching one's head, nor even, necessarily, all of the habitual symptoms of such an affection as Graves's disease, would inevitably be registered by any mark transcending those of normal activity and fatigue, though in the end such changes would be likely to occur, and in the case of Graves's disease it is quite probable that by finer modes of research lesions will be found, especially in the medulla oblongata. We know that other affections presumably referable to cerebral or spinal disease, such as diabetes, progressive muscular atrophy, tabes, are occasionally met with in association with Graves's disease. The decisive investigations in this direction must be left for the future, but it may safely be predicted that when lesions are found they will be discovered not only in the medulla oblongata, but in higher and related centres as well, and probably in the peripheral nervous system in addition, as Maude has justly assumed.

The essential characteristic of the neuroses and psychoses is, to my mind, that in their origin, and at first, they are quasi-physiological, though morbid, manifestations of cerebral activity.

As one observes the smooth flow of life in a healthy man, all his functions seem so firmly harmonized, so absolutely subordinated to the interests of his conscious personality, that it is difficult to conceive what organized riots, what complex displays of independent action will make their appearance when once this harmony, this healthy interdependence of function is disturbed by disease.

The laws under which these outbreaks occur are the laws of "dissolution" of the nervous system, and it is the merit of Hughlings Jackson in England, and of Charcot and his followers in France, to have studied them with prëeminent clearness of insight.

The point for our notice is that, under the conditions indicated, the multiform nerve functions which, under the normal regime, were kept within their proper channels of usefulness, now, deprived of leadership and control, run riot like a horse that has lost his rider, though it may be, as Dr. Jackson has pointed out, that they act in a real though misguided attempt to meet the exigencies of the movement.

It is for this reason, and because even in disease the likeness to normal action is preserved, that the term quasi-physiological is justified.

Does all the vast array of symptoms of this mysterious Graves's disease form a confused and accidental jumble, or can we find the bond which unites them?

I have already indicated that such a bond has been sought in the anatomical relationship of the nerve centres related to these various symptoms. It has been sought also in the action of some supposed poison generated in consequence of disease of the thyroid gland. Either or both of these hypotheses may be true, but behind, and independent of them, there is, I believe, a physiological or quasi-physiological bond which unites the symptoms of Graves's disease, and this is of a double nature.

1. They are united by their close relationship to the

manifestation of emotion. The trembling hand, the staring eyes, the rapidly beating heart, the sweating skin, the husky voice, the relaxed bowels, belong to the picture of painful expectancy and fear. The likeness, though but a caricature, is too striking to be mistaken, and has attracted the attention of a number of observers, among whom I will mention McKenzie in England, and Peter and Raymond and Sérieux in France, and Buschan in Germany.

It is an important advance in conception and definition, rather than a discovery, of modern psychology, to recognize that outward expression not only illustrates but forms an integral part of the mental state with which it occurs. This is eminently true of the emotions, as James, Lange and Féré have clearly shown. An emotion is an intellectual cognition plus a host of bodily states which we can only imperfectly analyze and separate.

In Graves's disease the first impulse to the outbreak is often, if not usually, an emotional cause. In a case of my own, a woman went down a dark stairway, and at the bottom was suddenly seized and roughly handled by a man, and then and there her disease began. Many such cases are on record (see Brain, 1894, p. 221, and Buschan).

But, it will be urged, many cases of Graves's disease begin insidiously without emotional antecedents, and sometimes in such a manner as to make it more than probable that a disease of the thyroid gland, or it may be even an irritation starting in the nasal cavity or elsewhere, set the match to the train. I have observed myself an interesting case where prolonged vomiting gave the first impulse. It is also true that the disease may run its course without being associated with any high degree of emotional display.

The explanation for this I have already tried to suggest. We cannot tell absolutely why the predisposition to this or that special neurosis exists, but, given the predisposition, it is enough to call out, by some local excitement, any one

of the symptoms which belong to the quasi-physiological group, and the rest will make their appearance. Just as we can work ourselves up into the outward show of passion for our own amusement, and without feeling passionate, so the outward shows of passion may be called out, it is fair to think, by some purely reflex cause, without their usual emotional accompaniment, if only there is sufficient coherence between the different elements of the symptom-complex to form a tolerably definite group.

In a predisposed person, either a prolonged attack of tachycardia, or an enlargement of the thyroid, or a poisoning from thyroid secretion, or any one of many causes may bring on the disease.

2. I have tried to point out how this array of symptoms only indicates one of the modes of dissolutions, so to speak, of the nervous system, and that herein the relationship of Graves's disease to the other degenerative neuroses finds itself explained. Even when regarded as a symptom-complex of agitation and fear, it is still, not only as subserving some definite end, that the symptom-group is to be looked upon, but in part as a phenomenon of a paralytic or degenerative character. This is indicated by the term embryocardia, which has been used as a substitute for tachycardia, to indicate the degenerative nature of the heart failure.

In fine, the best explanation of Graves's disease and of its relation to the affections observed with it,—so far as an explanation is possible,—seems to me something like the following: The cardinal symptoms of the disease are united by a physiological bond, in that they form a group characteristic of strong emotion of the nature of expectant fear. Even the conjoined affections are all excitable under the influence of emotion, as an examination of Féré's important volume on the pathology of the emotions will show. To a certain extent the numerous symptoms of Graves's

disease form a coherent group, and are capable of independent existence as a "segmented" piece of cerebral activity, to use the term of Prof. Josiah Royce. Although often excited by emotion, this segmented group of activities may be called out in various other ways. The prolonged existence, for example, of either one of the symptoms may after a time call out the rest. In this way, emotional excitement, irritability of the medullary centres, goitre, tachycardia, may serve as the starting point of the whole assemblage of symptoms. In this way, too, the increased secretion, or any other disease of the thyroid, may contribute to the nervous erythism, general or local, or increase the tendency to the outbreak in an otherwise predisposed person.

If one lobe of thyroid is the larger, or if nasal or uterine irritation exist, these influences will contribute their share to the modification of the symptom-complex.

Conversely, any treatment which tends to relieve any part of a train of morbid processes,—the general nervous excitability, the uncontrolled action of the heart, the local irritation starting from any part of the body or from the thyroid,—will contribute to the cure of the patient.

In short, I regard Graves's disease as a "degenerative neurosis"; as one of the ways in which the nervous system suffers "dissolution"; as marking one of the many lines of cleavage at which the nervous functions break when exposed to strain.

DISCUSSION.

Dr. George B. Shattuck, of Boston.—Dr Putnam has certainly stated for us in a very admirable manner all that is to be said at the present time with regard to the modern views of the nature and treatment of exophthalmic goitre.

My only complaint in regard to his paper would be that it was possibly too condensed, too concise.

I am very glad that this subject was taken up here to-day, and in such a competent manner, for two reasons. One reason is, because the disease about which Dr. Putnam has read his paper, is one of a large group of very complicated and mysterious disorders, and any light which can be thrown upon any one of that number will help us to a better understanding of the entire group.

It is a disease which has been for a long time an opprobrium of medicine, and one which all of us have in the past approached with misgiving as to our ability to procure positive improvement when a case came into our hands.

The other reason that I am glad that the subject has been brought up here on this occasion and to-day is, that if it is to be discussed in the Medical Section it is time that it was done. It is one of the numerous diseases which the surgeons seem disposed to wrest from us and include in the department of their universal profession. If we are to discuss it from a medical point of view, it is high time we should begin.

Our reasoning in regard to this disease has been up to the present time, and after listening to Dr. Putnam's paper I still think it continues to be, purely hypothetical. The treatment has been largely empirical, and I am afraid that even now it continues to be so.

I was in hopes that Dr. Putnam would be able to give us a little more encouragement with reference to the treatment; some spar to which we might cling with the hope that we might be carried to the shore of positive knowledge with reference to the general reasoning as to the cause of the disease.

Dr. Putnam has stated very concisely and thoroughly the various forms of treatment which have recently been brought forward with reference to Graves's disease. It is only a very few years ago that an edition of one of the most trusted books on the practice of medicine, by one of our most worthy clinicians, informed us that in the treatment of Graves's disease iron is useful where anæmia is present; strophanthus modifies the rapid action of the heart; no measures are so successful as rest in bed in the recumbent

position, with an ice-bag or Leiter's coil applied occasionally over the heart. This is not a very encouraging picture of what could be done for a patient. But we have got beyond such a condition as that. Dr. Putnam discusses the use of the thyroid and thymus extracts, though with but moderate encouragement to be sure. He refers to the methods of surgical interference. Those are of several kinds, viz: the partial extirpation of the gland; the tying of the arteries—the whole or part of them; and the total extirpation of the gland. Then we have internally the administration of the phosphates—the phosphate of sodium, showing some results reported as good so far.

Whatever may be said as to the success of such measures, at any rate they show a certain courage and an inventiveness for combating the disease.

I have had some experience in the administration of the thyroid, though not of the thymus, and I must confess with Dr. Putnam that the results have not been encouraging. They do not agree with the flattering reports of some of the continental clinicians, who seemingly have much better results. Theoretically one does not see why the thyroid extract should be useful in this disease. It is given in myxœdema, a disease accompanied by atrophy of the thyroid; and now we give it in Graves's disease, where we have an hypertrophied thyroid gland.

If we give thyroid extract to cure both of these diseases it is because we say the secretion may be increased, diminished, or perhaps *vitiated*. Our only excuse can be that our measures are empirical and our reasoning hypothetical.

The treatment has to be continued for quite a long period, and the patient, as well as the doctor, must have hope, courage and patience. And there is again the difficulty referred to by Dr. Putnam, that in a great many of these cases the symptoms are aggravated by the administration of the thyroid extract; the action of the heart is increased just as it frequently is in the opposite condition—myxœdema, and one often feels like giving up the treatment altogether.

The report of the proceedings of the German Surgical Congress held in Berlin in April is very interesting with regard to the surgical treatment of Graves's disease, and as I remember the accounts of the experiences given there

by different continental operators who have had, in addition to large series of thyroidectomies, a certain number of these operations for Graves's disease pure and simple, I should say that they reported their results as being rather more favorable than Dr. Putnam considers them to have been. Certainly several of the gentlemen at that time stated their strong belief in the efficacy of the operation for the relief and cure of Graves's disease,—they were certain that they had seen some cures in their practice. Some recoveries, however, do occur without treatment.

As I said before, I wish that something a little more definite, a little more positive, could be offered us with reference to the knowledge of the cause of this disease, and that some more hopeful forms of treatment might be suggested. Perhaps we are on the threshold of an actual step forward.

Dr. Kocher's last series of one thousand cases, reported at the surgical congress at Berlin, gave a mortality of a fraction of 1 per cent. With such a low mortality rate as that, I would not hesitate to recommend a patient to submit to an operation if one could give hope of considerable relief.

These operations were partial. Kocher has given up the total extirpation of the gland on account of the resulting cachexia.

Dr. Putnam.—In trying to present so large a subject in so short a time, it has been necessary to condense, to the great detriment of different portions of the topic.

I certainly do not feel at all pessimistic about our ultimately learning to know the nature of the disease or the best therapeutics. My more hopeful feeling perhaps communicates itself to my patients, for it certainly seems to me that I see better results than formerly, both in hospital and private practice, though an absolute cure is perhaps not to be looked for.

I believe that the electrical treatment referred to in my papers is useful. Phosphate of sodium we do not know much about. Rest should be made almost absolute for a time, and if possible out of doors. Thyroidectomies have been beneficial. The only reason we do not recommend them is that now and then an unexpected death results, and

we do not care to subject our patients to this risk, though it is a slight one. You cannot tell which patient is going to die.

In answer to the question as to the effect of hypnotism on this disease, I would say that I regard hypnotism (as the word is commonly used) as the last term of a series of agencies which are well calculated to increase the personal influence of the physician, and to enlist the hidden forces of the patient's mind for his benefit. When properly used I think these means may be of great value.

ARTICLE XVIII.

THE DIAGNOSIS OF MALARIA FROM THE PRESENCE OF PARASITES IN THE BLOOD.

By PHILIP KILROY, M.D.
OF SPRINGFIELD.

READ JUNE 11, 1895.

DIAGNOSIS OF MALARIA FROM THE PRESENCE OF PARASITES IN THE BLOOD.

In the subject assigned to me, and as stated on the programme, the word bacillus was inadvertently used. The protozoon of malaria as described by Laveran is an animal parasite belonging to the protozoa, and cannot therefore be properly called a bacillus. It were needless for me to mention the practical interest there is for us in a subject like this. We have most of us had malarial chills occur in the first week of childbed, and fretted and curetted and drained and all that, and without any reason. I remember during the past winter being puzzled for a week in trying to decide whether a patient had typhoid or influenza, to find the disease subside on exhibition of quinine; and the annoying similarity between malaria and some cases of tuberculosis and various forms of sepsis needs but to be mentioned. In this paper I shall simply endeavor to give, and give briefly, the modern belief with regard to the parasites of malaria; and while for the opinions expressed I shall not give credit to whom credit is due, neither shall I claim any for myself.

The parasitic origin of malaria was accepted, and taught even, before the parasite was discovered,— a belief scientifically plausible in view of the endemic occurrence of the disease, the suddenness and regularity of its attacks, as well as the completeness with which it was controlled by drugs; and the rapid deterioration in blood quality which followed even one or two malarial chills suggested the presumption that in the blood would be found some evidence of that which was responsible for the destruction of its corpuscles.

Back in the seventies observers (especially Italian) endeavored to isolate a bacillus from the Istrian marshes and the soil of Campagna, and two authorities succeeded in cultivating a rod-shaped structure, which they believed to be the cause of malaria, and which they hastily named bacillus malariæ. And in my days in the medical school — from 1885 to 1888 — the then text-books referred to this discovery approvingly, if not with acceptance. Later observations caused this bacillus to be completely abandoned, and the apparent malarial attacks which its inoculation on rabbits produced were probably ptomaine or surgical fever due to improper asepsis, especially as even to-day it is not certain that rabbits can have malaria. In 1880 Laveran first discovered one variety of a protozoon, which is to-day recognized as the determining cause of the disease, and which we call the polymorphous parasite of Laveran, — polymorphous, for it assumes different forms in different localities and in different types of the disease, and sometimes even in similar types in the same locality. And thus it was that we have had such contradictory testimony by competent authorities, some having observed one variety of the parasite, others a different one. There are four main types of the protozoon of malaria : —

1st —Spherical bodies.
2d —Segmented bodies.
3d —Flagellæ.
4th—Transition bodies.

The spherical bodies — which are the most important because the most numerous and most frequently present— are small, movable structures of pale color, hyaline transparent, devoid of nuclei, sometimes showing, when free in the blood, two or three flagellæ or thread-like processes; but when they have invaded a corpuscle or attached themselves to it (and the latter is the more probable occurrence)

they are devoid of these ciliary attachments. Having invaded or adhered to a corpuscle, the spherical body rapidly grows in size and frequently exhibits amœboid movements, which give it a constantly changing appearance. These amœboid structures are commonly called plasmodia. The spherical bodies contain granules of black pigment, — the greater the size of the body the greater the number of pigment spots. Sometimes the spots assume a circular arrangement inside the edge of the parasite; sometimes they are irregularly distributed and endowed with movements of very irregular character, sometimes fast, sometimes slow, and in various directions. It is very probable that the amœboid movements of the bodies are due to the movement of these spots, as they have been observed to be coincident.

As the spherical bodies grow in, or on, a corpuscle the color of the latter disappears, from a destruction of its hæmoglobin, the corpuscles gradually become transparent, while the parasitic body becomes a deeply pigmented mass which may now undergo segmentation, forming the second variety, or segmented bodies.

These are also spherical in form, but regularly segmented, with the melanin formed from hæmoglobin destruction in the centre, the whole suggesting in appearance a full-blown rose or a marguerite. The segments gradually develop into independent spherical bodies, the decolorized corpuscles are disintegrated, and at the end of two or three days, according to the type of the disease, this new generation of spherical bodies results in a fresh attack.

The flagellæ, or third variety, are sometimes free in the blood, sometimes (as already mentioned) attached to the spherical bodies. They are long threads, endowed with a rapid, snake-like movement, a movement that frequently sets the neighboring corpuscles in vibration. They are found in about one case in five, but the difficulty of seeing

them (it being probably impossible to see them when not in motion) may account for their apparent rarity. Their movements are best observed about twenty minutes after the blood has been taken from the patient. They have a life of their own, but which is quickly killed by quinine.

The transition bodies, which are said to be characteristic of the fall and winter Roman fever, as well as of all the various atypical malarial manifestations, are crescent-shaped bodies, transparent and colorless. They differ from the spherical bodies in that they have but little pigment and that only in the centre, and while the spherical bodies adhere firmly to a blood corpuscle, the transition bodies never do. If these should happen to be in contact with the corpuscle a blow on the slide will easily displace them. Their ends are either sharp or round, and frequently we can discern a fine line on the concave side of the crescentic body, joining the ends. The central pigment is changed hæmoglobin. The general appearance and character of these bodies, their size and lack of any evidence of life or motion, has suggested the probability of their being semi-destroyed and changed blood corpuscles, a belief which more modern investigation has disproved.

There is an essential difference in the appearance of the parasites of tertian and quartan malaria. In tertian, the amœboid movements of the spherical bodies are more active than in quartan. In tertian the decolorization of the corpuscles is rapid, while in quartan the color remains almost until the corpuscle is disintegrated. The spherical bodies are smaller in tertian, and with smaller pigment spots, than in quartan; but the most striking and most reliable difference is in the process of segmentation; in tertian there being almost twice as many segments formed from one parasite, the segments being naturally smaller. If, then, during a malarial attack we examine the blood, and find decolorized red corpuscles in which a parasite is undergoing

segmentation into fourteen to sixteen parts, we can say with positiveness that the fever is tertian; while if there are but seven or eight segments we can diagnose with equal positiveness quartan fever. Quotidian fever is probably not a type, being either double tertian or triple quartan, resulting from the segmentation process maturing on successive days.

At the onset of an attack, or in the fever period, we are more apt to find the spherical bodies. The segmented bodies occur chiefly during the cold stage or in the intervals, while the transition bodies are mostly observed in the chronic forms of malaria, malarial cechexia, and malarial neuralgias, and also in those who have acquired a tolerance for the poison. While, with a good oil immersion lens, we can usually detect the parasites in the natural blood; still, for the sake of precision and to guard against confounding plasmodia with the red corpuscle of poikilocytosis, the blood should be stained. The best results are probably obtained from the dried specimens. A drop of blood is squeezed between two cover glasses, by means of pincettes rather than the fingers, as the vapor from the latter may change the hæmoglobin; when the blood has dried in the air it is heated in the usual way, and then treated with a staining solution. For practical purposes a cover glass heated for a few minutes in an alcohol flame is dried sufficiently, although an exposure to a temperature of 100 to 120 degrees Celsius for a few hours gives better results. If overheated, the parasite may become fixed, and not take any stain. In mounting preparations with Canada balsam, the latter should be dissolved in xylol rather than in chloroform or turpentine, as these latter decolorize the corpuscles. The parasites of malarial are best stained by methyl blue, and a staining fluid consisting of one part of a concentrated aqueous solution of methyl blue, and two parts of a 1 per cent. alcohol solution of eosin, gives beautiful results, in

which the hæmoglobin of the red corpuscles is stained an eosin red, the eosinophilous cells a deep strawberry red, and the ordinary leucocytes and the malarial parasites blue.

DISCUSSION.

Dr. Frederick W. Chapin, of Springfield, referred to the hypodermic use of quinine in the treatment of malaria, as practiced under his observation more than twenty years ago by Dr. Frederick D. Lente, of Cold Spring on the Hudson, N. Y. Dr. Lente injected six grains under the skin, after the chill, and one injection was often enough to put an end to a severe attack.

Dr. Francis H. Williams, of Boston:—Dr. Kilroy's valuable paper calls attention to a subject which is yearly becoming of more importance to many of us, as malaria is found more frequently now in certain portions of the State than it was a few years ago. The assistance which we may derive from the examination of the blood in these cases cannot be too often emphasized.

The characteristics which Dr. Kilroy points out as distinguishing the parasites of tertian from those of quartan fever are extremely interesting.

My own experience in making the diagnosis of malaria by finding the parasites in the blood has extended over some years, and I have found these blood examinations not only of great assistance in making a diagnosis in some otherwise obscure cases of malaria, but in excluding malaria in cases which simulated it. For example, I recall a patient who was sent into the Boston City Hospital with the diagnosis of meningitis, the head symptoms were marked, the morning and evening temperature chart showed no rise in temperature, and there was no chill. An enlarged spleen suggested to me the advisability of examining the blood, and on doing so I found numerous plasmodia. The patient was given quinine, and when he became rational we found that he had recently arrived from Central America, and that chills had begun when three days out of port.

As an illustration of the assistance in excluding malaria which examinations of the blood offer, I recall a patient who had a daily rise in temperature and a daily chill; he seemed in good general condition; quinine made but slight impression on the temperature and chills; no plasmodia were found in the blood. Later the diagnosis was made clear by signs in the lungs and by finding the bacilli of tuberculosis in the expectoration.

Dr. Kilroy speaks of the different varieties of parasite for the tertian and quartan form of malaria. As he says, the quotidian form may be due to a double tertian or a triple quartan. My experience suggests that the quotidians we have here are double tertians. During recent years I have used (*Boston Medical and Surgical Journal*, March 9, 1893, and November 15, 1894) Dock's method of giving quinine in treating malaria. In a few of two series of cases I have been obliged to give a second dose on the second day, as there was a rise of temperature on that day. All of these cases which had a second dose were quotidians; the first dose had probably acted upon one set of the tertian parasites and the second dose on the second set. After the second day all of the symptoms disappeared.

Malaria fevers in Baltimore, to the number of 616, have been carefully studied during recent years by Drs. Thayer and Hewetson, and the results of their labors have been most attractively presented in the work which they have just published.

ARTICLE XIX.

THE TREATMENT OF ENLARGED PROSTATE.

THE NON-OPERATIVE TREATMENT OF HYPERTROPHIED PROSTATE.

CASTRATION FOR HYPERTROPHIED PROSTATE.

By ARTHUR T. CABOT, M.D.
OF BOSTON.

THE OPERATIVE TREATMENT OF PROSTATIC HYPERTROPHY.

By FRANCIS S. WATSON, M.D.
OF BOSTON.

READ JUNE 11, 1895.

THE NON-OPERATIVE TREATMENT OF HYPERTROPHIED PROSTATE.

BY ARTHUR T. CABOT, M.D., BOSTON.

We intend to confine ourselves in this discussion to the treatment of cases of enlarged prostate. It is necessary, however, to briefly review the pathological changes involved in hypertrophy of the prostate, in order to properly understand the indications for treatment.

The increase in size is due in part to a hyperplasia and hypertrophy of the glandular portions of the organ, and in part, also, to a great increase of fibrous and muscular tissue throughout the prostate. Sometimes the fibrous tissue forms distinct tumors, similar in many respects to the fibroids so common in the uterus.

This overgrowth in the prostate may be circumscribed and mainly confined to certain parts of the organ, or it may be generally diffused. Its main interest to us lies in the question as to the extent to which it encroaches on the urethra and thus interferes with the outlet of the bladder. If one lateral lobe is especially enlarged it pushes the urethra to the opposite side, and the lateral pressure may so flatten out the canal as to greatly impede or to prevent the flow of urine through it.

The part of the gland more commonly concerned in the obstruction to urination, however, is the so-called third lobe, which lies between the ejaculatory ducts and the bladder, and which really forms no distinct lobe except when hypertrophied. Then it may project far back into the bladder as a rounded swelling, or may form an elevated ridge

below the urethral orifice, and, in either case, is likely to act more or less as a valve to occlude this orifice.

It is not then the size of the prostate gland merely that causes the obstruction, and a very large prostate may not encroach on the urethra sufficiently to interfere with its functions, while, per contra, a moderate enlargement of the third lobe may entirely close the orifice of exit from the bladder.

According to Guyon there is a primary stage of congestion of the prostate which precedes the state of enlargement and to which the earlier symptoms are due. This is a condition which cannot be clearly recognized after death, and the existence of which is made probable by clinical evidence rather than proved by demonstration.

Associated with enlargement of the prostate, and to a great degree dependent upon it, are other serious pathological changes. The efforts of the bladder to overcome the obstruction in the prostate naturally lead to a hypertrophy of the muscular coat of that organ; and presently the failure of the bladder to completely free itself of the urine leads to its dilatation.

Sacculation is caused by the protrusion of the mucous coat, forced between the fibres of the muscular tunic by the efforts of the organ to empty itself. Extending further backward the obstruction gradually leads to dilatation of the ureters and the pelves of the kidneys. Associated with these changes we frequently have a slowly forming sclerosis of the kidney, due to hypertrophy of the interstitial tissue.

Inflammatory changes in the genito-urinary organs behind the prostate are also brought about, and, when once existent, are perpetuated by the obstruction in the prostate. Cystitis, which is usually the first inflammatory condition to appear in these cases, may be induced by a stone forming in the residual urine, may result from some exposure to cold or to some uncommonly irritating condition of

the urine, but usually owes its inception either to the irritation of some instrumental interference or to micro-organisms introduced on urethral instruments.

Inflammation in these cases, starting in the prostatic urethra and about the neck of the bladder, may have a vesiculitis or epididymitis associated with it. Later it may extend backwards through the ureters to the pelves of the kidneys, to there set up a pyelitis and, later, a pyelonephritis. This backward extension is greatly favored by the dilatation of the ureters which so often precedes the inflammation.

Such being briefly the course of the disease, what may be done in its various stages to stay its progress and to overcome its morbid tendencies?

So little is known of the cause of the enlargement that the physician can give but little advice as to prophylaxis, based on any generally recognized physiological data as to sexual habits. The clinical evidence, however, of the importance of congestion as one element at least, in the discomfort of the disease, makes this condition one which is worth consideration. This congestion is a passive one, and is most noticed when the patient is at rest or horizontal. In short, it is when the circulation is under least pressure that the venous sinuses of the prostatic plexus become loaded with blood.

Any measures which diminish passive congestion may therefore act in a more or less prophylactic way and considerably diminish much of the discomfort of an enlarged prostate. To this end a vigorous mode of life is to be recommended, and sedentary habits are to be avoided as far as possible. If the patient has been sitting or lying for a long time, it is often well to walk about vigorously for a few minutes before passing water, as the act under these circumstances is much more complete than if performed while the congestion is still somewhat occluding the urethra.

Horseback exercise has sometimes been held to be injurious, but it seems to me that it is often of use in these patients just as it is in patients who suffer from hæmorrhoids, because it so stimulates the circulation as to diminish the tendency to passive congestion.

Any chill of the surface which throws the blood to the internal organs is also to be avoided, and it is well for the patient to seek an inland climate where such surface chills are less frequent than on the seashore. Warm clothing is especially to be recommended for this same reason. During the early stages of the disease, care in these ways, with the avoidance of alcoholic beverages and articles of food which make the urine irritating, is all that is usually required. If the urine becomes sharply acid, and consequently the call to urinate is greatly increased, an alkali should be administered. Sometimes, also, sandal wood oil is very useful in diminishing the irritation about the neck of the bladder. The iodides and ergot have had some vogue in the treatment of these cases, but satisfactory evidence that they accomplish any reduction of the gland is wanting.

During this early stage of the disease instrumentation is to be avoided. It may often be necessary to use the catheter once to determine the presence or absence of residual urine, but if it is found that there is no residuum, in short that the obstruction has not yet become established, it is usually well to abstain from the use of the catheter, which acts as an irritant upon the prostate, which is beginning to be sensitive.

As the disease progresses and presently offers considerable obstruction to the passage of urine and leads to the accumulation of a residuum, the catheter then becomes a necessity of treatment. If the residuum amounts to but two or three ounces it will probably be sufficient to use the catheter but once a day. Sometimes when the residuum is

but small, the persistent use of the catheter for a number of weeks will enable the bladder to recover its power, and the catheter can be laid aside, to be resumed if the residual urine again appears.

If the catheter is thus used early, the later ill consequences of obstruction may, to a great extent, be avoided. The bladder which is emptied once or twice a day does not become dilated and suffer loss of power through over-distension. Thus are nipped in the bud also, those deeper changes of dilatation in the ureters and pelves of the kidneys that so soon associate themselves with an over-distended bladder and that lead to the secondary changes in the kidney, which are a menace to the lives of these patients.

Recognizing then the value, or rather the absolute need of the catheter in these cases, it behooves us to remember also that the use of this instrument is not without its own dangers and discomforts, which require care for their avoidance or treatment.

In the early stages of the disease, where the catheter is first used to settle the question as to the existence of residual urine, it is well to make this test in the evening at the patient's home, so that recumbency may be maintained for some hours after the instrumentation. Often the first use of the catheter is required for the relief of a sudden retention due to an acute exacerbation of swelling in a prostate that had been enlarging insidiously for some time. And here, too, horizontal rest after emptying the bladder is of great importance.

In the choice of instruments, those which pass with least irritation are to be preferred. The soft rubber catheter, which finds its own way and has not sufficient stiffness to risk any harm, has the widest usefulness with these patients who are often unskilful and yet have to be entrusted with the care of their bladders.

When the canal is so closed that a stiffer instrument is necessary, the elbowed catheter of Mercier, or the English gum elastic catheter, can be used. If a patient shows especial skill, the silver instrument, which is indestructible, may be found most serviceable.

The greatest cleanliness is to be enjoined, and in obtaining this the soft rubber and silver instruments have a great advantage, in that they are not injured by hot water and may be boiled without injury.

In obtaining asepticism it is to be remembered that the urethra is very sensitive and resents contact with corrosive sublimate or carbolic acid, and that many a urethritis is set up in these patients by the too lavish use of these disinfectants. In the early treatment of these cases it is well to boil the catheter each time before use, but after the parts have become habituated to instrumentation the thorough immediate washing of instruments with hot water and soap before and after use is usually sufficient. The lubricant also should be clean vaseline,* which is unirritating and aseptic. Such are in brief the precautions which should be observed in approaching a case of prostatic enlargement in which obstruction is just developing.

Suppose, however, that a case presents itself in which retention behind such an obstruction has fully developed, and we find the bladder considerably distended by a pint or more of residual urine. Under such circumstances we may suspect that dilatation of the ureters and pelves has already commenced. If we find the urine abundant or over-abundant in quantity, but of low specific gravity, we have reason to believe that interstitial changes have already begun in the kidneys, and if the patient has a dry mouth and a lack of appetite, with occasianal attacks of nausea, this will indicate that already the elimination of urea is in-

* That which is contained in tubes has great advantages of portability and cleanliness.

sufficient. It is worthy of note that in this condition of renal disability, even when so far advanced that the breath has a strong urinous odor, the examination of the urine may give no indication of trouble in the kidneys beyond the low specific gravity above noted.

An examination of the heart at this time may show the secondary changes due to the increased tension of an arterio-sclerosis. With a patient in such a condition, the surgeon is face to face with a serious problem.

The choice must be made between allowing things to take their course along a steadily downward road, or making an effort by the use of the catheter to relieve the distension of the bladder and so remove the back pressure upon the kidneys. The latter course would be unhesitatingly adopted were it not for the dangers that beset it. In these over-distended bladders it is a matter of the greatest difficulty to institute the use of the catheter without setting up an inflammation of the bladder, which extends up the dilated ureters to the kidneys.

Besides the usual chances of inflammation being set up by the irritation of the catheter, or by germs introduced on it, there is in these cases the added danger from the congestion of the bladder walls, which is likely to result from a too sudden relief of the internal pressure. The hæmorrhagic tendency may be so great as to lead to a profuse and troublesome hæmaturia if the bladder is too quickly emptied. The injurious effects of the sudden diminution of the pressure in the urinary passages may make themselves felt at once upon the kidney, and a sudden increase of the nausea and other commencing uræmic symptoms, together with a rapid diminution in the amount of urine excreted, is often noticed.

With these possibilities of immediate serious consequences from the use of the catheter in these cases it may well be believed that such a course is not always wise, and it is a

matter of nice judgment to distinguish the patients who will probably bear the institution of the catheter life from those who will not. In doubtful cases the question may well be left for the decision of the patient and friends, as would be done in the matter of a serious operation of somewhat questionable propriety.

If the use of the catheter be decided upon, the dangers above outlined should be borne in mind. The patient should be put to bed, the urine should be made as unirritating as possible by regulation of diet and by medication if necessary. The general condition of the patient should be taken into account and treated; as, for instance, if the circulation is disturbed, heart tonics may be required. The catheter should at first be used but once a day with the patient in a horizontal position, and but a portion of the urine should be drawn at a time. A good rule to commence with is to hold the catheter so that the stream is projected from its orifice, and to stop its flow when the urine begins to drop perpendicularly from its end. In this way the over-distension is removed and the stretching of the bladder wall is relieved each time without entirely removing the internal pressure.

After this has been done once a day for a time it may be repeated and gradually carried from twice to three times in the twenty-four hours, and as it becomes evident that the bladder tolerates the interference, a larger and larger quantity may be removed until finally the bladder is emptied each time.

I remember one extreme case in which the bladder formed a rounded tumor above the umbilicus, and in which on several occasions when a little too much urine had been drawn the patient had serious uræmic symptoms. After this patient had been under treatment for nearly a month the urethra had become habituated to the use of the catheter, but little had been accomplished in really reducing the size

of the bladder. He then returned to his home in Canada with directions to continue drawing a measured quantity of water two or three times each day in the manner that had been practised here. I saw him a year and a half later in much better condition, drawing his water completely three or four times a day, but he told me that it was a long time before the catheter finally emptied the bladder.

This case shows what may be accomplished in this way in a patient who is constantly on the verge of uræmia. Mr. Reginald Harrison has suggested that in these patients with distended bladders it may sometimes be well to use the aspirating needle to partially empty the bladder rather than add the irritation of a catheter to that caused by drawing off the urine.

An aspirating needle may be used for a number of days in these cases without any local ill effects, as has been repeatedly shown in cases of impermeable urethra, and Mr. Harrison's suggestion to begin the relief of the bladder by a route which can easily be kept aseptic may be decidedly practical in some of these cases, especially those in which while the urine is still clear and limpid the bladder is greatly distended and prostate very large.

Dr. Keyes, in his paper on "Nephritis in its Surgical Aspects," read at the third Congress of American Physicians and Surgeons, suggests a somewhat different method of treating these cases. He uses a rubber catheter which is kept in a bichloride solution, 1 to 4000, and which is rinsed in hot water immediately before and immediately after each use. For a lubricant he uses glycerine. As he introduces the catheter he lets a stream of 1 to 4000 bichloride solution flow through the instrument, and thus irrigates the whole urethra. He draws the urine entirely, but slowly, with the patient in a recumbent position. He then at once washes the bladder with a solution of nitrate of silver, 1 to 1500 or 2000. He then washes the bladder with a 6 per

cent. salt solution, and finishes up with a 1½ per cent. salt solution, of which he leaves what he judges to be a proper quantity in the bladder.

These manœuvres are repeated each time that the catheter is passed, except that the irrigation with nitrate of silver may be used only every second or third day if that seems best. Finally, when the tissues become hardened, a non-disinfected catheter may be safely used if simply kept clean.

I cannot speak of this method from personal experience of it, as since Dr. Keyes read his paper I have not happened to have one of these cases of distended bladder under my care, except such as were already affected with cystitis. I confess, however, that in a case of extreme distension of bladder and pelves of kidneys, I should approach with misgivings any plan which should contemplate any considerable change of the tension under which the kidneys were doing their work.

Under Dr. Keyes's plan, with good judgment in the matter of the amount of salt solution which should be left in the bladder, this danger may be avoided, and, with his high authority, the method is certainly worthy of serious consideration and careful trial.

We lastly come to speak of the complications or secondary conditions which arise in the course of prostatic cases, and which require modifications of treatment. Acute attacks of inflammation in or about the prostate require such treatment as is appropriate to the care of acute prostatitis under other circumstances. The need, however, of catheterization under these conditions introduces a disturbing element, and one which may make recovery without operation difficult if not impossible.

The commonest complication in prostatic patients is cystitis, affecting usually the prostatic urethra as well as the bladder, and readily extending, as we have seen, to the

kidneys. Besides the treatment of these cases by rest and appropriate medication, we must remember that the disease is largely due to and perpetuated by the retention of fermenting urine and mucus behind the obstructing prostate, and must recognize that it is in these cases that irrigation is therefore especially needful.

For this purpose dilute solutions of boracic acid, permanganate of potash or nitrate of silver may be used. If the bladder is sensitive, great care is necessary not to abruptly distend it, as roughness in this way will often start a troublesome tenesmus.

From one to three ounces is usually sufficient to introduce at one time. When, as is often the case, the bladder contains much tenacious mucus it is sometimes of advantage to throw the fluid in with considerable force in order to detach the mucus from the bladder wall, but even in this case, a small quantity of the fluid should be used at each time.

When the bladder is much sacculated it may occasionally be wise to use more fluid, and to somewhat distend the viscus in order that the side pockets may be washed out. Sometimes, in spite of all care, the cystitis persists in an aggravated form, and the sensitiveness of the prostatic urethra is extreme.

In a patient who cannot void his own urine the frequent use of the catheter furnishes an added irritation, and the bladder is presently in a condition of almost constant spasm. Something must be done to give the bladder a rest, and this can be accomplished by establishing constant drainage.

Of the operative measures applicable to this condition you will hear later, but it is often possible to afford these patients great, if not complete, relief by fastening in a catheter. It is surprising often to see the immediate benefit obtained by this measure, and not only are the painful symptoms relieved, but the serious evidences of kidney disability

when present, will also in many cases disappear. With a catheter in the bladder affording an easy escape for the urine, we can give these patients large quantities of water and flush out their urinary passages in a way that is impossible with a bladder in a spasmodic condition, which must rid itself of its contents either by painful efforts of urination or by the frequent irritating introduction of an instrument.

And many a patient threatened with suppression may owe his recovery to the possibility of supplying him with this natural diuresis. I have seen the twenty-four hours amount of urine jump almost at once from sixteen to sixty ounces when relief was thus offered.

Such is a brief outline of the care which, when faithfully carried out, will enable the majority of these patients to lead a reasonably comfortable existence often for a long series of years.

CASTRATION FOR HYPERTROPHIED PROSTATE.

BY ARTHUR T. CABOT, M.D., BOSTON.

We come now, gentlemen, to speak of the subject of castration for the reduction of an enlarged prostate. This subject has a great interest for all practitioners dealing with this class of cases and, especially, for surgeons interested in this branch of surgery.

In 1893, before the American Surgical Association, Dr. J. William White, of Philadelphia, suggested the removal of the testes as a means of bringing about the shrinkage of an enlarged prostate, and, in support of this suggestion, adduced many facts showing the intimate relations between the functions of the testes and the size of the prostate. The non-development of the prostate in eunuchs and in animals that have been castrated early in life has long been known; also the fact that in animals which have a distinct rutting period, the prostate is often an insignificant organ except at this time when it reaches enormous development.

Dr. White argued that if the absence of the testes produced so much effect in preventing the development of the prostate, that, possibly, their removal might bring about the shrinkage of a gland already fully formed or even hypertrophied. In support of this suggestion he reported experiments upon dogs in which he was able to show that after the removal of the testes in fully developed dogs, the prostate did indeed undergo shrinkage.

The microscope showed that this diminution in the size of the prostate of the dog operated upon was brought about by the disappearance of glandular elements and also of muscular fibres.

Dr. White also, in connection with his argument, called attention to the morphological similarities between the prostate and the uterus, and to the fact that they both had so intimate an association with sexual life that there was ground for the hope that the prostate after castration might act as a uterus with commencing fibroids often does after oöphorectomy.

Since the appearance of this suggestion and these arguments of Dr. White, the subject has been advanced by operating surgeons beyond the experimental stage and many cases have been castrated, in accordance with Dr. White's suggestion, for the cure of hypertrophied prostate.

In a paper read recently before the American Surgical Association, and, later, before the American Association of Genito-Urinary Surgeons, Dr. White has recited the results obtained by him from the study of the statistics obtainable up to this time. I am able to give his figures with a close approximation to accuracy. He has collected 111 cases with 20 deaths, which would give a mortality of 18 per cent. Analysis of the cases, however, showed that 13 of the 20 deaths could not be considered as really due to the operation; that is, the patients died in spite of the operation but not in consequence of it.

Eliminating these cases from the statistics we have 97 cases with 7 deaths, or a mortality of a little over 7 per cent. I would say that I heard Dr. White read his paper and entirely concurred with him in considering the cases thrown out as ones in which the patients were so desperately sick that their final demise could hardly be laid at the door of the operation. In a private letter Dr. White says, "Some of these seven cases were almost equally desperate, and I have no doubt that the mortality is less." He further writes me, that of the cases that survived, apparent failures, that is, those in which no improvement was noticed or distinctly stated in the report, amounted to something less

than ten per cent. This would give us a percentage of about 83 as the measure of success attending these first 100 operations.

I think that to most surgeons these figures were rather a surprise. The operation was at first looked upon as a trivial one, which might be regarded as having little or no mortality, instead of which we find it has a very decided risk, almost as great as that of a litholapaxy performed at the same time of life.

It is difficult to compare these statistics with the commonly accepted figures which give us the mortality of the various forms of prostatectomy. Many of the fatal cases following a prostatectomy occur in patients with the same serious conditions as were those which Dr. White, I think properly, eliminated from his table, and the statistics of prostatectomy would have to be similarly revised in order to afford a fair comparison.

It seems difficult at first sight to believe that there can be any comparison between the mortality of so slight an operation as castration, and so serious a mutilation of delicate parts as is involved in a completed prostatectomy. It is to be remembered, however, that the condition after a prostatectomy is one which affords a very important drainage of the bladder, and, therefore, leaves the kidneys in much better condition to withstand the stress of convalesence than is the case after castration, where the relief of obstruction may be considerably deferred.

It is possible, too, that we may find that we have another element of danger to reckon with in these operations. I refer to the shock and deterioration which the nervous system may suffer from the loss of the testes. The decidedly bracing and stimulating effect which the testes exert on the whole system is generally recognized, and the inferiority in vigor of an emasculated animal is notorious. It may well be questioned whether this influence ceases when the full

growth of the individual is attained. If it does not so cease; if, as Brown-Sequard believed, the testes furnish the system with tonic and stimulating substances, then in this fact we have a partial explanation of the unexpected rate of mortality reported up to this time.

If we give any weight to these considerations we must feel, as I certainly do, that the patients who have experienced relief from the operation must be watched for a longer time before the exact measure of success in their cases can be estimated; and until time has elapsed for the accumulation of facts in regard to the subsequent vigor and nervous balance of these men, we must be cautious in assuring these old patients that there are no reasons except sentimental ones against castration at their time of life.

Of possible significance in this connection is the fact that in the cases collected by Dr. White, mania followed the operation in at least two instances. I have had one experience worth noting here.

In December, 1894, I saw James W., a strong man of 75, who had been troubled for five years with considerable difficulty in connection with urination. At the time that I saw him the catheter was being used regularly as he was unable to pass any water without it. He was then suffering from an acute attack of inflammation. This subsided somewhat after rest in bed, but during his treatment the catheter touched a stone and an operation was decided upon.

On January 2, 1895, the stone was easily crushed and pumped out. The patient being in a good condition at the end of this operation the testes were removed. Previous to the operation the patient was for the most part clear mentally, but occasionally had slight confusion of ideas. He tore off the dressing after recovery from ether, and was in a distinctly bad mental condition the following day. From this time he continued in a mildly maniacal condition, which persisted through the month of January, and

presented the typical form of confusional insanity, with occasional exacerbations when he was quite maniacal and noisy. For some days after the operation he had considerable pain and increased resistance over the right kidney.

During this time the wound in the scrotum healed kindly, and the prostate diminished considerably in size, making the passage of the catheter much easier than it had previously been. On February 14th, he passed some water voluntarily. On February 19th, he was as much confused as ever, his mind occupied with delusions and often much depressed, referring constantly in his talk to the loss of his testes and to his business troubles. It was now decided to try the effect of the injection of testiculin.

On February 28th, when he had been for eight days receiving from 30 to 45 minims daily, the record was made: "The injections are very painful and are hurting him much. His mental condition has changed decidedly since they were started. His friends, who do not know the character of the treatment, are much pleased with the change which they began to notice two days after the first injection. He is less restless, sleeps better and worries less."

On March 6th, we have the record: "For the past four days the testiculin has been omitted, and there is a decided change for the worse, his condition having become much as it was two weeks ago. March 16th, testiculin is being used every day. Mental condition constantly improving."

After this, the injections having been very painful, they were omitted, and the mental condition continued steadily to improve. He was able to use a silver catheter himself, and finally left the Hospital March 30th.

I heard later from his physician, Dr. C. D. Sawin, of Charlestown, that Mr. W. did quite well and went about with some degree of enjoyment and comfort. Some time toward the end of May, after a long ride in a carriage, he was again taken down with acute symptoms with considera-

ble pain referred both to the bladder and the region of the right kidney. This was accompanied by high fever and delirium; and he gradually failed and died.

Dr. Sawin was able to get a partial examination and found the prostate about the size of a hen's egg. The third lobe was enlarged to the size of a pullet's egg, and projected upwards and backward into the bladder. On its apex was a calcareous deposit firmly adherent. Posterior to this, extending forward in the body of the prostate was a cavity with smooth walls which contained about a teaspoonful of gravel. The bladder wall was thickened and injected, and showed on its surfaces a few hæmorrhagic spots. The kidneys were in a state of acute pyelo-nephritis, and the right was about one-third larger than normal.

These cases may all of them have been examples of simple post-operative mania, which is not very rare in old persons, but I would say that in my experience of perhaps between two and three hundred operations upon the bladders of old men, I do not remember a single other instance of similar maniacal condition. So that I am inclined to reserve my judgment in regard to the remote nervous effects of these operations.

The time put at my disposal was so short that I have felt obliged to confine myself to the portions of the subject in which I feel an especial interest, and I know that Dr. White in his excellent papers upon the subject has presented more cogently than I can his strong reasons in support of the operation. So well and so convincingly has he put the case that practitioners throughout the country have adopted the operation, which is so simple that it may be readily performed by those of but slight surgical training to whom a prostatectomy would be an impossibility. It is on this account that my remarks have assumed somewhat the character of a note of warning, and I do not wish them to appear in any way to detract from the merit of Dr.

White's brilliant suggestion and important experimental work.

I certainly believe that the operation has a legitimate, perhaps a large field of applicability, and in order to determine what this is, it is important that the cases should be observed and recorded with great care both before and after operation.

What we wish to know is whether castration relieves obstruction due to enlargement of the lateral lobes, or whether the third lobe is equally affected. Dr. White thinks that as he has found the third lobe rich in glandular structure, this might be expected especially to shrink. In my case reported above, the castration reduced the size of the prostate very markedly, but did not enable the patient to dispense with the catheter. At the autopsy the third lobe was found to be of large size projecting back into the bladder.

A second question is as to the effect of castration on the fibroid tumors which are found in some prostates.

Thirdly, what rôle does a diminished congestion play in the reduction in size? The occasionally very rapid effect produced would suggest the possible importance of this.

Fourthly, may it not sometimes be well to combine drainage with castration, thus affording immediate relief to the cystitis and pyelitis while the prostate has time to shrink at its leisure?

Fifthly, is the removal of the testes followed by any profound nervous shock, or is any deterioration or loss of balance of the nervous system likely to follow it?

In the above hasty remarks I have taken it for granted that, for the present at least, the operation would be confined to cases so seriously affected that some operation is imperatively demanded. It is conceivable that, if subsequent experience proves castration to be free from remote disadvantages, patients may sometimes elect to have it done

early in the disease, before the bladder and kidneys have suffered secondary changes, and when it might be more efficacious in arresting subsequent morbid growth than afterwards in removing it.

Such possibilities are so alluring that we should approach them with cautious and careful scrutiny.

THE OPERATIVE TREATMENT OF PROSTATIC HYPERTROPHY.

BY FRANCIS S. WATSON, M.D., BOSTON.

In the paper which we have just heard from Dr. Cabot, that part of the subject which deals with the palliative measures has been discussed; they suffice in the majority of cases to avert or postpone the dangers of the disease, and to make the patient wholly or tolerably comfortable. It remains to be considered in what way we are to deal with that unfortunate minority of sufferers who, in spite of them, go on from bad to worse. For them there are, fortunately, other means which may relieve. These are the operative ones.

They may be divided into two classes. 1. Palliative. 2. Radical. The former consist of the various ways of draining the bladder, and are equally applicable to temporary, or to long continued, or permanent drainage. The two ways of securing bladder drainage are through the perineum by a perineal urethrotomy, and from above the symphysis pubis by a supra-pubic cystotomy.

The technique of these operations is so familiar that I will only refer to some of its more important points when speaking of drainage.

When drainage is conducted through the perineum, it is desirable to provide for it in a manner which will thoroughly drain the bladder, and, if the treatment is to be continued for a long time, will allow the patient to move about comfortably. The arrangement which I think best fulfils these indications is that which I devised some three years ago. It consists

of a hard rubber button with a hole in the centre through which a catheter is passed, and four smaller holes, two on the upper and two on the lower margin, to which are attached four stout round rubber cords, which, when fixed to a waist band properly adjusted, hold the button firmly against the perineum.

The central hole in the button is to be one size smaller than the catheter it carries; if the catheter is stretched its calibre is of course diminished, and the button can then slide along it, but becomes fixed at whatever point may be desired by letting the catheter take its natural shape.

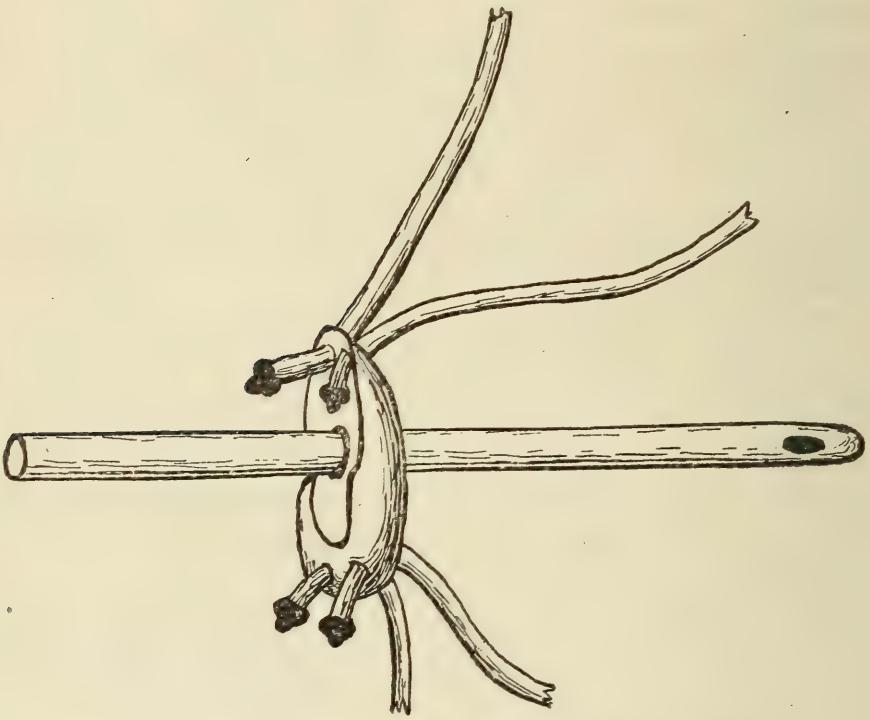

Fig. 1. The author's perineal drainage tube, and hard rubber button.

Dr. Tilden Browne of New York has contrived a similar arrangement, of which he speaks as follows:—"The holder is of light construction except the two steel springs; these have sharp teeth which hold but do not puncture the rubber tube. The springs release the tube

by turning the screw collar. The cylinder has a calibre of thirty-five, French, and the spring teeth have play sufficient to hold any tube of from thirty-five to twenty-two, French. Tapes or narrow bandages slipped under the horns of the plate, then brought up radiating and secured to a waistband in front and behind hold the apparatus in place. A continuous tape for each side is preferable, as it permits the plate to remain stationary while they play through or under the horns, as the changed position of the body in sitting or reclining may necessitate. The plate is narrow enough not to meet the opposing surfaces of the thighs. Nor does it interfere with defecation. I have the patient wear a fresh pad of iodoform gauze between the perineal opening and the plate after each movement of the bowels." Fig. 2.

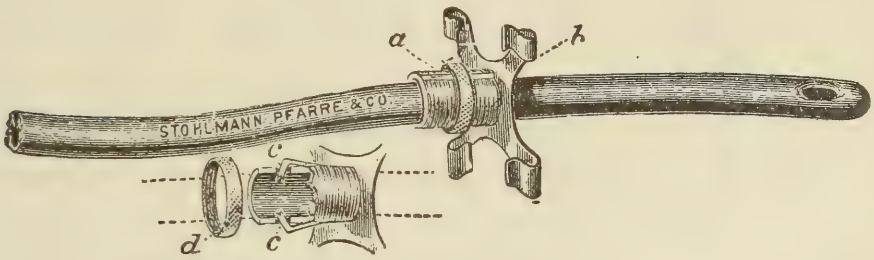

Fig. 2.—F. Tilden Browne's perineal tube holder.

Two catheters should be provided, one for the day and one for the night, the one not in use being kept in a weak solution of carbolic acid.

With regard to supra-pubic cystotomy, I think the practice of puncturing above the symphysis with a large trocar and leaving in the canula is a dangerous one, and should be condemned. It is much safer to do a true cystotomy. The incision into the bladder, when made for drainage alone, should be a short one.

Several modifications of the supra-pubic operation for drainage have been introduced, the most notable being that of Hunter McGuire, who several years ago devised a

method for making an artificial supra-pubic urethra, which he does as follows: The opening into the bladder is made at the lowest available point, and only the upper end of the abdominal wound is left open, the rest of it being sutured. This leaves a fistulous tract about three inches long, the walls of which are held together by pressure of the abdominal viscera and the action of the recti muscles. It is claimed that in this way the patients are given voluntary control of the bladder. Morris of New York has modified the operation by turning skin flaps down into the channel.

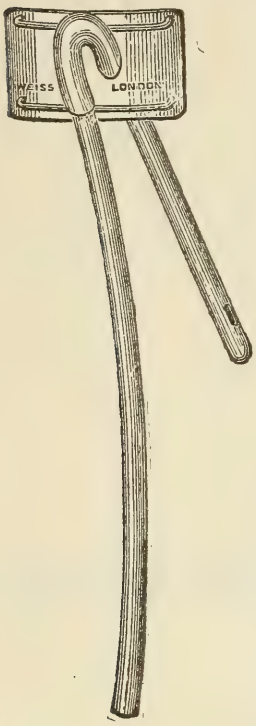

Fig. 3.
Buckstone Browne's supra-pubic drainage tube.

A variety of contrivances for carrying out supra-pubic drainage have been introduced; one of them will suffice as an illustration of those which are suitable for permanent drainage; it is that of Mr. Buckstone Browne (Fig. 3). While the patient is still confined to bed, the double tubes of Perier, led through the dressing, I have found to be the most useful of those that have been proposed. They are shown in Fig. 4. If properly applied, the patient is

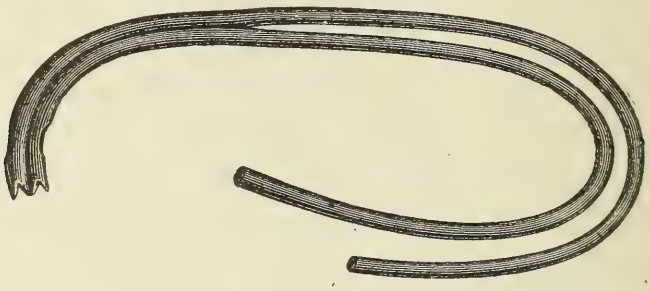

Fig. 4.

kept perfectly dry. Dr. Fowler of Brooklyn, and Dr. Farrar Cobb, of Boston, have suggested capillary drainage, the latter by means of an iodoform wick led through a

glass tube. This method, also, is applicable only while the patient remains in bed.

The relative merits of the high and low operations as performed for drainage alone are as follows: The perineal is safer, is more rapidly done—an important point in these cases in which the danger is greatly increased by the effect of prolonged etherization on the lungs and kidneys. In performing it the urethra can be laid open with one cut of the knife under primary anæsthesia, and as soon as this is done the ether can be removed. The disadvantages of the low operation are that some patients cannot support the presence of a catheter in the deep urethra, and that it sometimes causes epididymitis. The high operation avoids these drawbacks, and offers the special advantage of allowing exploration of the bladder; the tube also is generally worn more comfortably above the symphysis than through the perineum; on the other hand, the high operation is rather more serious, takes more time, and if there is a small, contracted bladder, or if the patient has a large belly, the high cut may be very difficult to execute. Occasionally the perineal operation is embarrassed by anchylosis of the hip. From which it will be seen that the choice will be determined by the condition of the patient, the degree of irritability of the deep urethra, etc. If, for example, the patient has chronic bronchitis, threatening uræmia, and is exhausted, one would naturally drain his bladder in the easiest and quickest manner possible, and that would be through the perineum; or if it is thought best to avoid even the slight shock of that operation, a catheter can at least be tied in through the urethra. A very simple and satisfactory way of doing this occurred to me while operating one day on a case of stricture; it is that shown in Fig. 5, and consists in slipping over the outer end of the soft rubber catheter that is to be passed into the bladder a piece of drainage tube about five inches long, which has been cut in halves longitudinally, except for an

inch and a half, through which the catheter passes, and by which it is firmly held so that it cannot slip in or out; all that remains to be done is to lay one of these halves along either side of the penis, and to retain them there by two circular strips of sticking plaster surrounding the organ. The catheter should be a little larger than the inner calibre of the drainage tube, so that the latter will bind it sufficiently to prevent its slipping in or out.

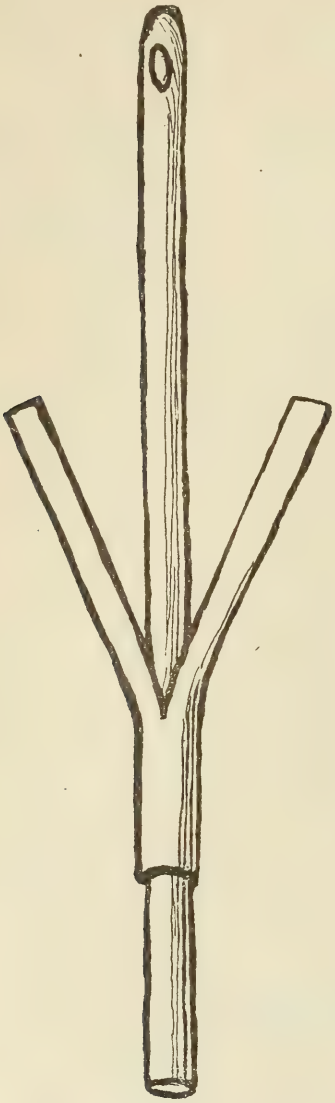

Fig. 5.—The author's method for tying in a soft rubber catheter into the bladder.

The benefit of permanent drainage is twofold; it relieves cystitis, and what is more important it often averts or lessens the dangers of pyelo-nephritis, which is so frequent an accompaniment of this disease. I do not think that sufficient attention has been given to this method of treating the pyelo-nephritis in this class of cases. Reginald Harrison advocated it several years since, and I have found it give strikingly beneficial results in a number of cases. The surest sign of improvement of the renal condition is an increase in the specific gravity of the urine; with it there is usually a marked gain in the general condition of the patient.

Whatever may be the manner of securing bladder drainage, its essential feature is, I believe, that it be maintained, or at the least that the channel for drainage shall be kept open, so that it may be resumed at any time, without a subsequent operation to re-establish it. This, because the conditions for which drainage was originally undertaken,

even if temporarily relieved, are, practically speaking, sure to return in this class of cases, if drainage is wholly suspended and the channel allowed to close.

RADICAL OPERATIONS.

Fig. 6.

The defect of the operations for drainage alone is that they do not remove the cause of the trouble. It is not surprising, therefore, that surgeons should have tried to do this; and dating from the time of John Hunter we find records of various methods by which removal of the obstructing portions of the gland was attempted. But the first systematic effort was made by Mercier, in 1857, who divided small median enlargements by means of specially constructed instruments, which he passed through the urethra (Figs. 6 and 7), and reported successful results. Mercier had no followers, however, until Gouley in New York and Bottini in Italy revived his operations about twenty years later; the latter performing them with a galvano-cautery instrument of the same form as that of Mercier's (Fig. 8); the former making the first step in advance by doing them through an external perineal urethrotomy.

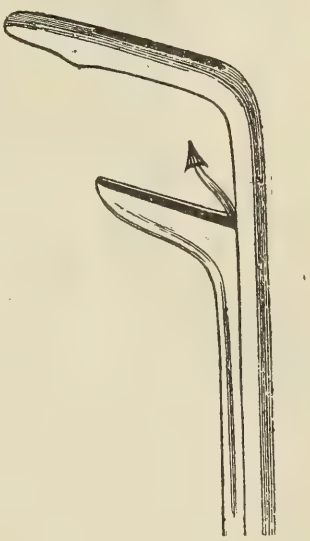
Fig. 7.

In 1884 Harrison reported successful results from tunnelling the prostate with a trocar, and instituting drainage by leaving the canula in the channel so made; then in 1886 we have the introduction of the supra-pubic method by Belfield of Chicago, and its establishment a litttle later

through the successful cases and advocacy of McGill and Atkinson of Leeds in England, under the name of supra-pubic prostatectomy. This was in 1886 and 1887. I did my first supra-pubic prostatectomy in December, 1886, and my first perineal prostatotomy in the spring of 1887, but these cases were not published until 1888, when they were reported at the annual meeting of this Society, in June.

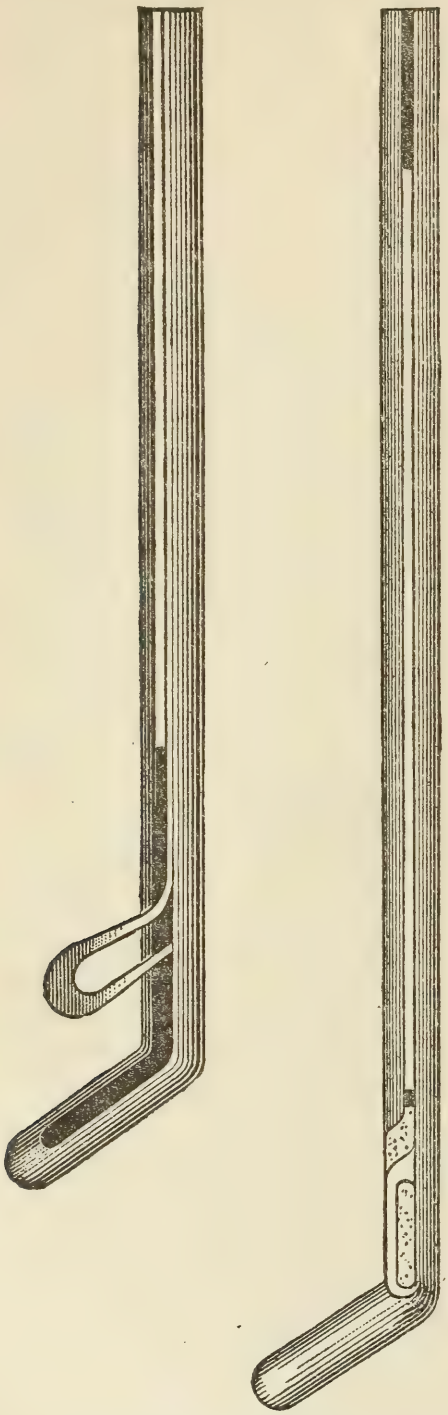

Fig. 8.—Bottini's instrument.

At that time the subject was in a very chaotic state; there was no agreement among the few surgeons who had done the radical operations as to the best methods to employ, and all such operations had recently been condemned by the authoritative statements of Sir Henry Thompson, Guyon and Socin.

The monograph which I published in 1888 had for its objects, to disprove the conclusions of Sir Henry Thompson and the others, to formulate the subject, and to place it upon a rational basis. In short, to show that these radical operations were feasible, in what class of cases they were

appropriate, to demonstrate what the conditions were that should determine the choice of method, how they were to be best performed, and finally what prospect of success they offered. The conclusions were based upon anatomical investigations that had extended over a number of years, and upon such clinical data as were then available; the latter consisting of twenty-one cases of prostatotomy and twenty-six of prostatectomy. The conclusion reached was that a majority of cases could be successfully operated upon through the perineal route. It must be remembered that the subject was in its infancy then, and that in spite of the improvements in the high operation recently introduced, it was still a much more serious one than at present; my opinions have been since greatly modified in favor of the high operation, and still more recent methods to be mentioned presently.

From this time there was a rapid advance and the number of cases reported multiplied fast. Opposition arose, however, especially from the French school, and was expressed in an interesting essay by one of Guyon's former pupils, Vignard, who in 1890 tried to prove that the loss of expulsive power of the bladder must be in the great majority of cases a factor fatal to the success of radical operations, even though, as had been demonstrated, the obstructing portions of the gland could be removed with moderate safety. He was met by Belfield and others with a mass of clinical observations which had within a short time afterward accumulated to the number of one hundred and fifty cases of radical operations, in which it appeared that two thirds of the patients who survived had regained most of or the entire power of natural evacuation of their bladders after the operations, and were in good general condition. Since 1892 the operations have been modified and their scope extended, and to-day the operative treatment of prostatic hypertrophy is a well recognized and established procedure.

Such is, in outline, a sketch of the evolution of this part of the treatment of the disease, up to the most recent steps in advance. The latter I will describe, so far as the very short time at my disposal permits, when speaking of the technique of the radical operations, which I will now take up in sequence, as follows:

1. Perineal prostatotomy. 2. Perineal prostatectomy. 3. Dittel's operation. 4. Tunnelling the prostate. 5. Zuckerlandl's operation for total extirpation of the prostate.

1. Perineal Prostatotomy consists as you know, in a division of a median enlargement through an external perineal urethrotomy; it is efficient in but a limited number of cases, those in which there is a bar at the neck of the bladder, and being but little less dangerous than (2) a perineal prostatectomy, which is more thorough, it has given place to that operation for the most part; the latter is applicable to such cases as have but little or no lateral enlargement, and in which the median enlargement is a bar simply or a small lobe. The condition of the prostate can ordinarily be determined beforehand by rectal examination, and exploration of the bladder with a short beaked sound, more or less accurately, and the method of operation selected accordingly. If there is a small pedunculated middle lobe it can sometimes be surrounded by a wire snare passed beside the left index finger and held in position by it while the wire is drawn tight by an assistant; if there is a bar at the neck of the bladder, the excision of a V or U shaped piece from its central part will usually open a clear road into the bladder; these incisions can be made with a probe pointed bistoury, or with a galvano-cautery, or with instruments of special forms called prostatectatomes, of which there are a variety; the after treatment consists in drainage and cleansing of the bladder.

Next comes Dittel's operation (proposed by him and executed by Küster). It consists in the excision of a wedge

shaped piece from each lateral lobe, at their anterior ends, after exposing the prostate and separating it from the rectum through an incision beginning at the tip of the coccyx embracing the sphincter ani in the form of an ellipse and terminating in the middle of the perineum. The object of the excision of these portions of the gland being to cause widening of the prostatic urethra by the subsequent cicatrization of these wounds in a lateral direction, with the idea that the part of the lateral enlargement bordering the urethra would thus be drawn outward to either side. Küster's cases were not sufficiently successful to encourage further trial of this method, nor does it seem to me to be founded on a sound principle, and finally there are other means at our disposal which promise better results.

Tunnelling the median lobe through a median perineal urethrotomy, as practised by Reginald Harrison, has already been spoken of when discussing drainage. I do not think that this surgeon now employs it, and there is no difficulty in draining the bladder satisfactorily through the posterior urethra. The distance to be traversed by a trocar in tunnelling is often long, and the opening up of the tissues is by no means free from danger; the operation therefore does not seem to me to be a good one.

The last of the perineal operations is that proposed by Zuckerlandl for total extirpation of the prostate; he suggests that this be done by separating it from the rectum, and then dissecting it from the bladder through a long transverse crescentic incision extending across the perineum from the tuberosity of the ischium on one side to that on the other; this operation has not, so far as I know, been actually performed.

SUPRA-PUBIC PROSTATECTOMY.

In the first place let us glance at the history of supra-pubic cystotomy apart from its application to the prostatic

removals. It is a time honored one, and has passed through many vicissitudes. The supra-pubic operation, properly speaking, had its origin in the hands of Pierre Franco, who performed it at Laussanne in 1560, for the removal of stone; we find already with him the suggestion of one of the modern steps of the operation, that of lifting the bladder upward, and making it more accessible by raising it by pressure from the rectum; this Franco did by two fingers of the left hand pushed well within the rectum. The case of Jean Doot of Amsterdam, a boot-maker, who, assisted by an apprentice, cut a stone out of his own bladder with a cobler's knife from above the symphysis, and lived to tell the tale for many years afterwards, is one of the most interesting of the early ones. Another of the modern steps was forestalled by more than three centuries by Rousset (1581), who tried to raise the bladder by filling it with water, and about one hundred years later (1685) Piétre accomplished the same end by introducing into the bladder a long beaked sound armed with an arrow-like point, which could be projected from its tip. After the preliminary incisions, the tip of the instrument pushed up the anterior wall of the bladder above the symphysis and pierced it with the dart, which then acted as a guide to the incision into the organ.

The operation was frequently practised by laymen, as were the perineal cuts for stone, especially by priests. These men were known as "cutters for stone," and if we may believe the records, some of them had as wide an experience and almost as great a success as the surgeons of to-day. The operation was not much heard of between 1650 and 1750, at about which time it was revived by Douglas and Cheselden in England, after which it became relatively popular and extended to France and Germany, being practised in the former most successfully by the priest Frere Cosme, who in 1799 had performed the operation one hun-

dred times with but nineteen deaths, not a bad record when we reckon with the absence of asepsis. In our own century, we find it in the hands of numerous surgeons: Dupuytren, Souberbielle, Sir Everard Home, Leroy d'Etiolles, Nelaton, Civiale, etc., etc. But between 1840 and 1880 the operation steadily lost ground on account of the introduction of lithotrity by Civiale, and of the much smaller mortality attending this and the perineal operations for stone.

In 1880 it was once more resuscitated by Petersen, who proposed to avoid wounding of the peritoneal fold covering the anterior surface of the bladder, which injury had been one of the chief dangers of the operation, by lifting the bladder well above the symphysis by means of the combination of filling the organ with water, and distending a rubber bag previously inserted into the rectum. This manœuvre, when practised in connection with the modern aseptic methods, lowered the mortality so much that the supra-pubic operation once more took its place among the favorite surgical procedures, and its use was very soon further extended by its application to cases of bladder tumors and prostatic hypertrophy.

In Petersen's method about ten ounces of fluid were injected into both the bladder and the rectal bag. Presently reports of cases in which the bladder had been ruptured or the rectum injured were published, the procedure was thus shown not to be free from danger. This accident, however, has happened very rarely, and if in the adult not more than eight ounces are used for each injection it practically never will happen. Many surgeons have discarded Petersen's method, employing instead the Trendelenburg position, Fig. 9, which was introduced by that surgeon about this time, and which has become since so familiar to all. The elevation of the pelvis in this position lets the abdominal viscera fall toward the diaphragm, in doing which they draw the bladder after them out of the pelvis above the symphysis.

Trendelenburg's position is of much service, but the patient should be kept in it for as short a time as possible, especially if he is old and enfeebled. On this account I prefer to make the preliminary incisions before so placing the patient.

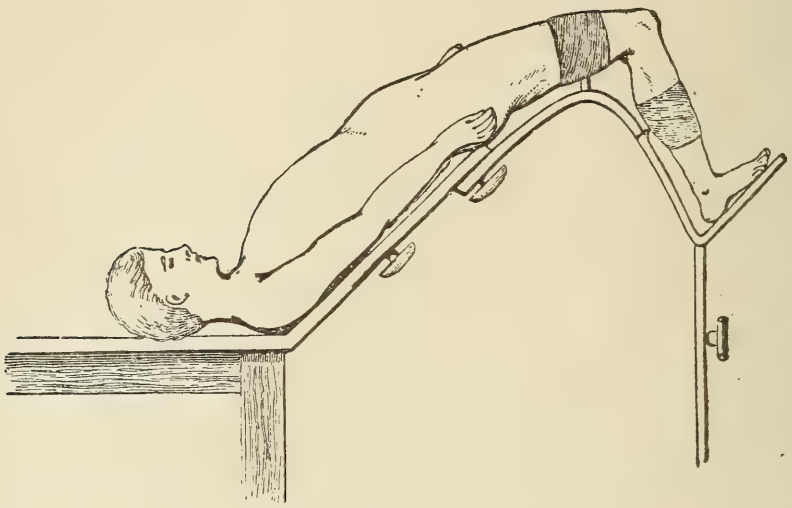

Fig. 9.—Trendelenburg's position.

As to the incisions themselves we have the choice between the old vertical one and the transverse; the former extends upward from the middle of the upper margin of the symphysis for about three inches, and is carried down to the prevesical space through the linea alba and between the pyramidales muscles. These first cuts can be made rapidly until the prevesical space is exposed. This is easily recognized by the fat tissue which fills it. Immediately beneath the fat lies the bladder and within the fat layer the peritoneal reflection of its anterior surface. The bladder is now exposed in one of two ways. The fat tissue can be raised up by the tip of the finger inserted below the symphysis, or it can be divided cautiously with blunt pointed scissors. I do not like the former method, because there is necessarily more or less disturbance of the prevesical tissues. When the fat is abundant a great quantity of it

has to be drawn up before the bladder surface is laid bare. A considerable cavity is formed in consequence, which gives lodgment to the urine, and may be the starting point of serious suppuration, even in our aseptic days, while the only objection to dividing the fat with scissors is the chance of wounding the peritoneal fold, which lies in it, but with ordinary care this is easily avoided. The bladder presents itself as soon as the fat is divided. It is readily recognized by its bluish red color and by the large veins upon its surface. I think it best to place the patient in the Trendelenburg posture when the prevesical fat is reached and before it is divided. In doing this as the pelvis is raised, if the tip of the finger is laid in the wound the bladder can often be felt as it emerges from the pelvis. With Trendelenburg's as with Petersen's method the peritoneal attachment is usually carried far enough above the symphysis to readily escape being wounded. If using the former it is well before opening the bladder to protect the peritoneal cavity from the urine by packing sterilized pads around the part of the bladder to be incised. If the patient is not in Trendelenburg position a tenaculum should be passed through the bladder wall below the peritoneal attachment and held by an assistant in order to keep the bladder raised after it has been opened. The same result may be obtained by passing a suture through the bladder wall on either side of the proposed incision and through the margins of the abdominal wound; this can be done with a short curved needle. The tip of a long beaked catheter which has been previously passed into the bladder and pressed against its anterior wall above the symphysis, though not necessary, serves as a good guide in opening it. The transverse cut gives more room, and the bladder can be exposed more rapidly by it. Its defects are the risk of hernia and more or less impairment of function of the muscles. It is made in the form of a crescent, with its centre opposite and a little above the

middle of the symphysis, the deeper cuts being in the same line, and dividing the whole or a part of the recti and pyramidales. On turning up this flap the prevesical space and its contents are freely opened to view. Personally I make a compromise between the two, dividing the skin by the transverse cut, and turning back a good sized flap, the underlying fascia and muscles are thus fully exposed, and it is very easy to pick out the line of division between them, which I then lay open by the vertical cut, and if more room is needed later in the operation it can readily be gained by snipping with scissors the inner borders of the muscles on either side. It is very rare that more room will be required than is given by this means.

In opening the bladder the vertical or the transverse cut can be used. I see no advantage to be gained by the latter. The vertical cut into the bladder is to be made between the two sutures already described, with one stroke of the knife, avoiding the veins on the surface of the bladder, if convenient; no harm of consequence is done if they are wounded, for the congestion of the vessels is so much diminished when the organ is opened that hemorrhage ceases spontaneously as a rule. Up to this point the steps are alike for intravesical operations of whatever nature. In attacking the prostate there are special measures to be taken.

In the first place, much help may sometimes be gained by inspection as well as palpation of the gland within the bladder; to effect this several contrivances are used. Hurry Fenwick has introduced an instrument, which he terms a caisson. Figs. 10, 11 and 12 show this devise. By it is sought the opportunity to work at the bottom of a dry well, so to speak, on a diminutive scale, as is done on a large one in laying the foundations for the piers of bridges, etc. I have never used it and so cannot speak of it from experience.

Perhaps because of the partiality of the inventor for his own inventions, I like my own instrument best for this

purpose; it requires a little practice before it can be used with advantage, and I think it is rather more suited to cases

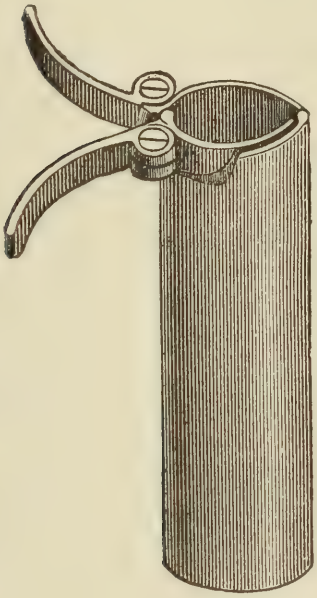

Fig. 10.

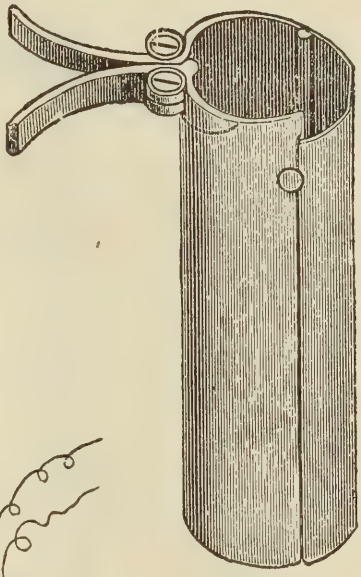

Fig. 11.

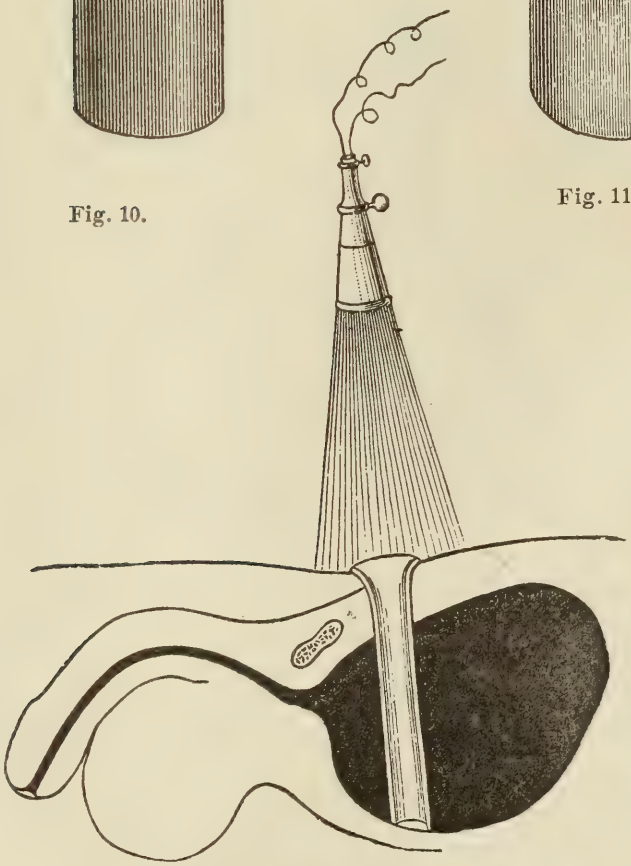

Fig. 12.

Hurry Fenwick's "Caisson" for inspecting the interior of the bladder.

of bladder tumors than to the prostatic ones, but it may be equally servicable in many of the latter. It is represented in Fig. 13.

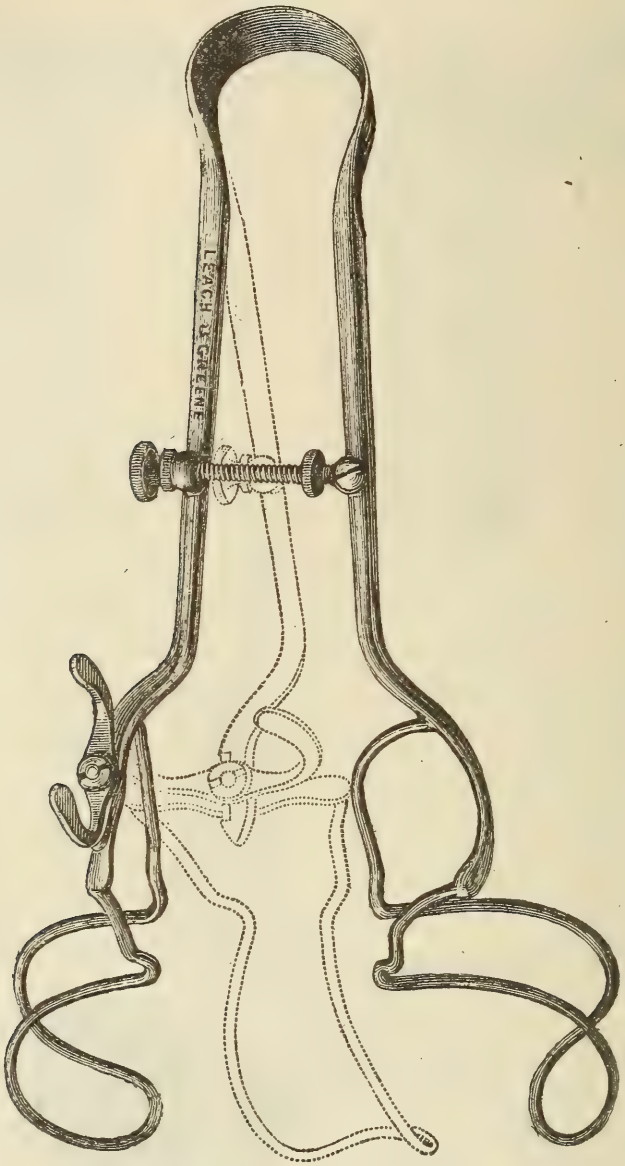

Fig. 13.—The author's bladder speculum.

The removal of the obstructing portions is effected according to their form and size; formerly, only the parts projecting into the bladder were removed, but it was found that

it was necessary to do more if a clear road for the exit of the urine was to be reëstablished, a prolongation of the middle lobe into the prostatic urethra is, for instance, pretty constant, and this when present should always be removed as well as the salient part of that enlargement within the bladder. Again it is often requisite to take away more of the lateral lobes than is represented by those parts which project within the bladder. This was at first done by splitting the mucous membrane and capsule over these parts, and shelling out the obstructing lateral portions, if, as often happens, they consist of distinct enucleatable masses (fibro adenomata); if not, by removing them with curette, or biting them off piecemeal with suitable instruments. Later, the same end was accomplished better by the combined operation, which will be described presently. If there is a salient middle lobe, it can be taken away with scissors, or galvano-cautery, or by the snare.

The *Combined operation* offers greater facility in effecting the removal of the lateral parts of the prostate than either the perineal or supra-pubic, alone; it consists in doing first the perineal, and then the supra-pubic, or vice versa, according to the conditions presented by the individual case. The mucous membrane and capsule of the gland are then incised over the portions projecting into the bladder, the finger of the left hand pushes the prostate up from below while the enucleation of one or both lateral lobes, in turn, is accomplished by the index finger or a blunt periosteum elevator; in doing this there is sometimes very free hemorrhage. The removal will have to be accomplished in some cases with a curette, in others it is not difficult to shell out the growth whole.

Nicoll has modified, and as it seems to me very advantageously, this operation, by not opening either the mucous membrane of the urethra, or of the bladder over the prostate. By his method a sound is passed into the deep

urethra to act as a guide, an incision is made into the perineum down to the apex of the prostate, but avoiding the urethra, the capsule of the prostate is then incised sufficiently to admit the tip of the index finger easily. In doing this, some part of the prostatic plexus of veins is apt to be cut and a more or less severe hemorrhage to result; this may be controlled by packing, while the operator proceeds to open the bladder by the supra-pubic cut. Through the latter incision, the prostate is pressed firmly downward by the finger from above, and as much of the lateral enlargements as may be required to give a free exit from the bladder are removed through the lower wound in the manner already described. Hemorrhage is not usually severe; when it is, it is best controlled by means of the tampon of Keyes as modified by Cabot (Fig. 14). The tampon consists of a long bit of sterilized gauze folded in squares upon itself, as shown in the accompanying figure. It is placed in the bladder and the thread which runs through all its layers (A) is carried out through the perineal wound, and upon being drawn tight and secured outside the perineal wound presses upon the bleeding area within the bladder. The second thread (B) is fastened to the upper layer only of the gauze and is led out through the supra-pubic wound. When it is desired to withdraw the tampon the lower thread is cut, and the upper one being pulled the gauze is unwound layer

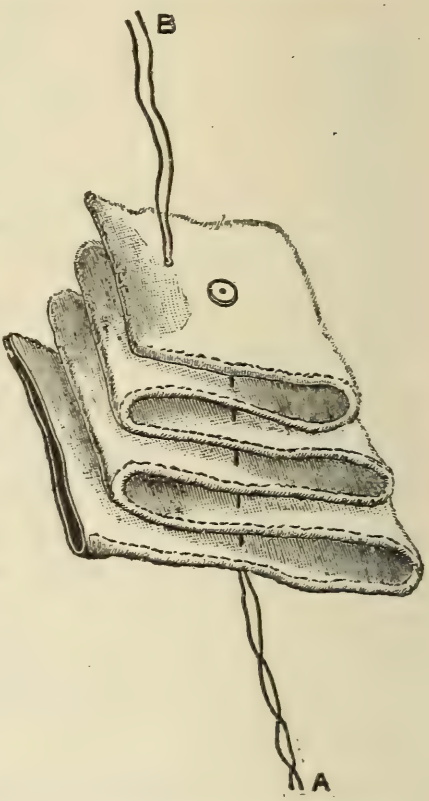

Fig. 14.—Cabot's Hæmostatic Tampon.

by layer without difficulty. This may be done usually at the end of forty-eight hours.

In cases in which there is great enlargement of the gland it might on rare occasions be desirable to use Helferich's modification of the supra-pubic operation; this consists in resecting the middle portion of the upper margin of the symphysis pubis. The intention of the operation being to give more room to carry out the subsequent steps.

There is finally one other method of entering the bladder, which I think is especially interesting. It is that proposed by Rydygier, and performed in three instances in my own knowledge, once by Dr. Frank Harrington and twice by Dr. Abner Post of Boston. I refer to making the bladder incision through its peritoneal investment instead of avoiding it. In the three cases referred to above the result was entirely satisfactory, and no harm whatever resulted. The advantages, of course, are that no time is lost in trying to avoid the peritoneum, that more room is afforded, and finally, that when it is desired, there is much better chance of securing first intention of the wound by suture. The bladder should be carefully irrigated beforehand, and a catheter *à demeure* is to be worn for about two weeks afterward.

Two questions remain to be answered. What determines the choice of operation, and what is the chance of success?

To answer them we must first know what has been done, and this is set forth approximately in the first table below, together with the mortality attending each method; and next, what is the percentage of cases in which there is restoration of the function of the bladder. This appears in the second table.

No. of Cases.		Mortality.
109.	Supra-pubic prostatectomy, and the combined operation	20%
29.	Perineal prostatotomy	10%
16.	Perineal prostatectomy	20%
3.	Dittel's operation	00%

The percentage of restoration of the bladder function after different operations is as follows:

Supra-pubic prostatectomy . . .	nearly	80%
Perineal prostatotomy	"	50%
Perineal prostatectomy	"	50% plus.
Combined operation		50%
Dittel's operation		30%

From the above it will be seen that the supra-pubic and the perineal prostatectomies have the highest mortality, but that the former has 30 per cent. more of recoveries of bladder function than any of the other methods.

This is what we should expect, since the supra-pubic and the combined operations are more thorough and more serious than the perineal ones. This too must be remembered when reckoning the mortality.

Then again, as Mansell Moullin points out in his last work upon the subject (Enlargement of the Prostate), published in 1894, the mortality of the first half of this series of supra-pubic operations was 25 per cent., whereas that of the last half was but 15 per cent.; and Mr. Mayo Robson, in 1894, published twelve consecutive cases with but one death.

It must be further remembered that this is the least favorable view of the operative results, that will be shown at any time in their history should the practice be extended in the future, because this series includes all the operations performed in what may be called the experimental stage of the undertaking, in which it must be remembered they have been applied to those cases only which have already passed into the worst forms of the disease.

Could we collect an equal number in which this operation had been performed earlier, in anticipation of the graver stages, we should no doubt find a greatly lessened mortality.

Then too, what of the dangers of not operating! We know very well that they are grave, but how great as com-

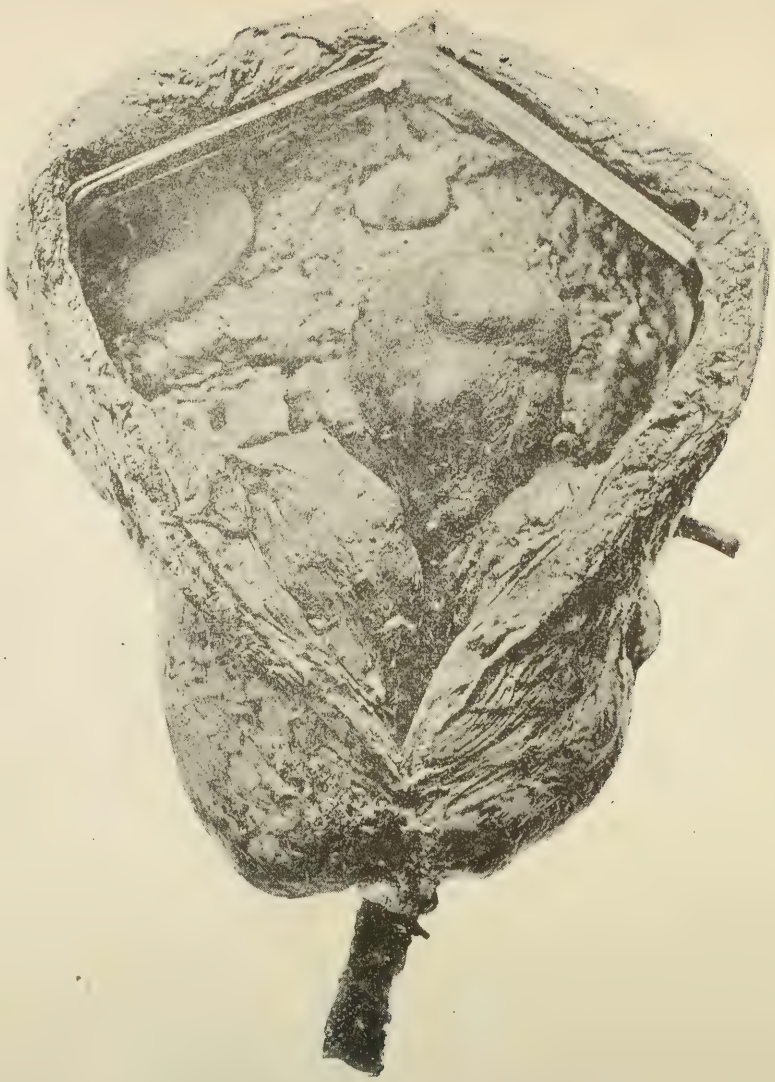

Fig. 15.—From the author's operative treatment of the hypertrophied prostate, 1888.

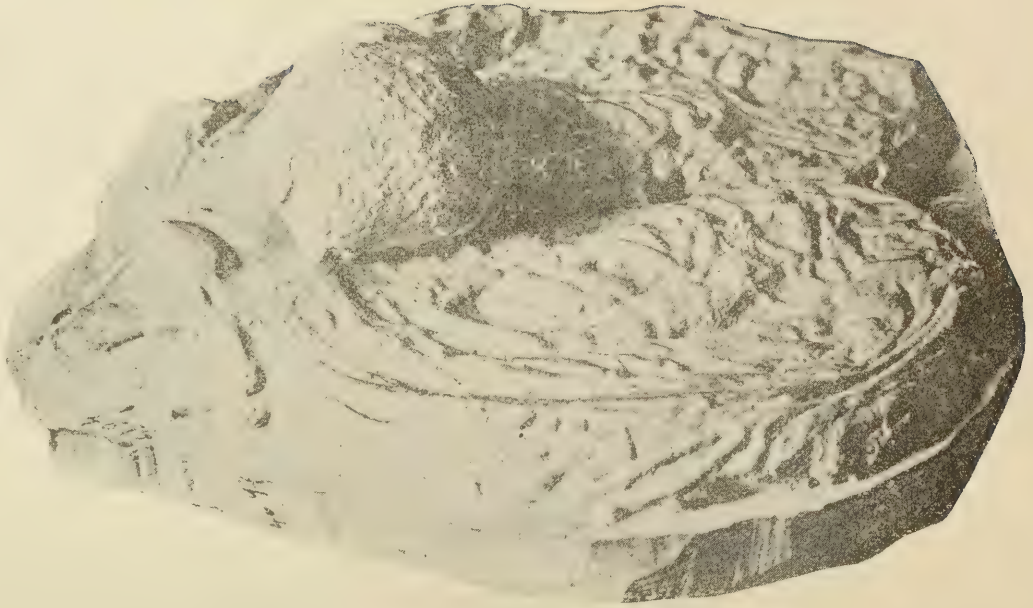

Fig. 16.—From the author's operative treatment of the hypertrophied prostate.

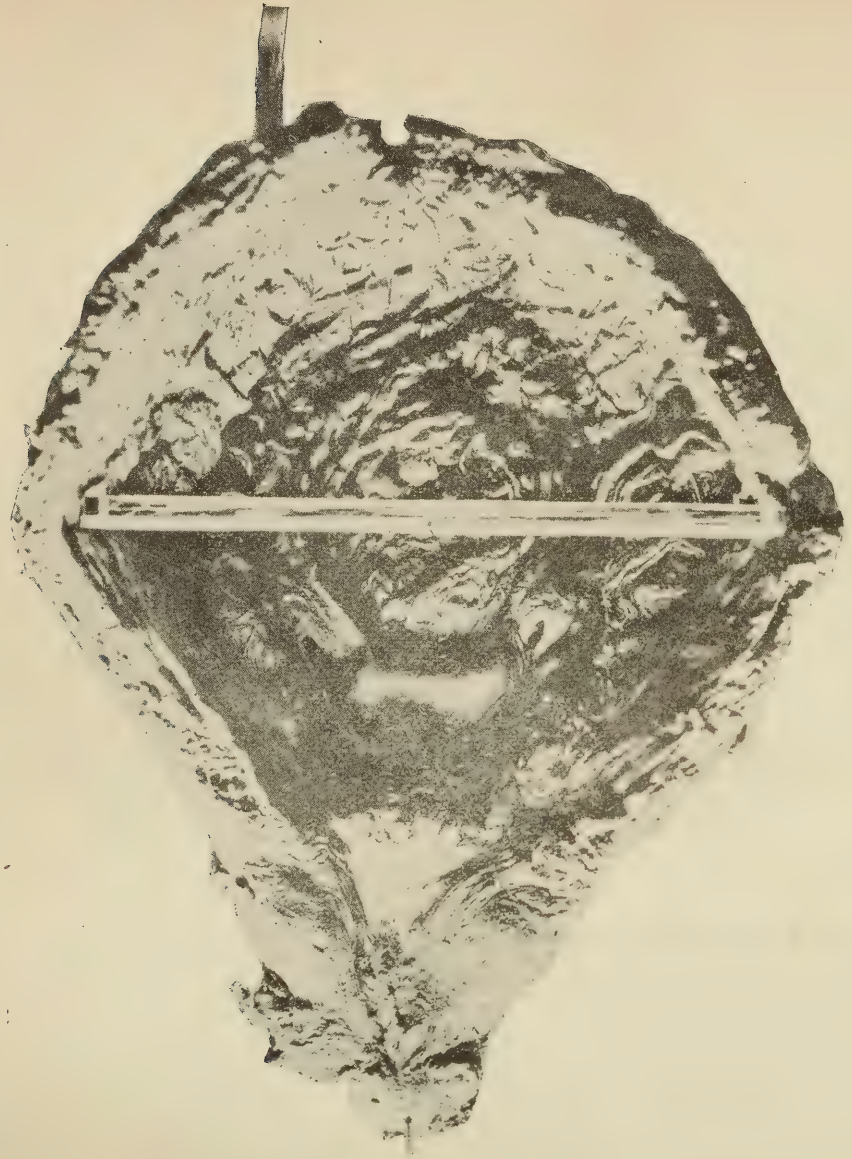

Fig. 17.—From the author's operative treatment of the hypertrophied prostate.

Fig. 18.—From the author's operative treatment of the hypertrophied prostate.

pared with the operative risk, we know not at all. No one has ever, so far as I know, formulated any extensive observations as to the number of cases of prostatic hypertrophy which had already reached the graver stages of the malady (in which condition, be it remembered, almost all the patients have been, upon whom the radical operations have been performed), and shown the results in the absence of operative, and while continuing under palliative treatment. If such compilation were made, it is my own impression that the comparison would prove favorable to the operative measures, in that particular class of cases.

The choice of operation depends, I think, upon the following factors. First, the age and general condition of the patient. Thus, if we have to do with a very feeble or a very old man, whose term of life is in all probability but a short one at best, we should naturally prefer to operate for drainage of the bladder alone, as described in the first part of this paper.

If the patient, on the other hand, is in good general condition, has not yet shown evidence of serious renal trouble, and might, if radically relieved of the obstructing prostate, live for a good many years, then it is right to try the more radical measures; and of these, for the reasons already given, I prefer the combined operation as modified by Nicoll for all cases in which it is necessary to remove considerable portions of the lateral lobes, as in Fig. 15, and the simple supra-pubic method, where the median portion alone is involved, and is large (Fig. 16). When there is a bar at the neck of the bladder, or a small median enlargement (Figs. 17 and 18), I think perineal prostatectomy is to be preferred. It will usually be successful, and is a safer operation than the high one. This is the view of the operative treatment of prostatic hyperthrophy that I should have given one year ago.

In the last year three new methods have come upon the scene.

The first is that of ligature of the internal iliac arteries for the purpose of producing atrophy of the prostate by limiting the blood supply. Of this I have only to say that it seems to me a thoroughly irrational procedure.

The second, suggested by Dr. Mears of Philadelphia, is ligature of the spermatic cords, with the hope of producing atrophy of the prostate, by a similar effect to that of castration, but by a lesser operation. Of this method there is not sufficient experience to base a judgment upon at present.

The third seems likely to revolutionize the treatment, and may perhaps replace and make obsolete all the operations which I have been describing to you. It is that of double castration, proposed by Prof. William White, of Philadelphia, in June, 1893. This part of the subject will be presented by Dr. Cabot, and I will therefore not enter upon it.

DISCUSSION.

Dr. L. Bolton Bangs, of New York City.—It is needless for me to say to you that the subject of prostatic enlargement and its treatment is, in my opinion, one of the most important surgical discussions of the day. When we consider the relation of enlargement of the prostate to human suffering, when we consider how many men of advancing years, who ought to go down to their graves in comfort, are the subjects of it, you will readily see, and I am sure you will agree with me in my opening remark, that it is one of the most important surgical questions of to-day to know how best to deal with it.

It has been stated by various teachers, by different surgeons, that prostatic enlargement makes its appearance in one man in three after the age of fifty, as some have it; and others state it after the age of sixty, and that one man in ten suffers from it. I once endeavored to make a record of all

the men I examined to determine how many really had prostatic enlargement, and whether my statistics are in agreement with "one man in three" I am not sure at this moment, but I came to the conclusion after observing a great many cases of my own that we are wrong in stating that prostatic enlargement begins after the age of fifty. I believe that it begins,—not that it always shows symptoms,—at an earlier age than fifty or thereabouts. At any rate, there are enough men sufferers from this condition. I may have it; you may have it. It comes to be a grim thing when we contemplate it from the personal standpoint, therefore there is sufficient cause to warrant taking every step, to balance with care everything presented to our attention, and to consider how best we shall treat these sufferers.

In the main I agree with everything that has been said in the able presentation of this subject this afternoon, certainly with regard to the palliative treatment, and for my comfort as well as for yours it should be borne in mind that the largest proportion of men with prostatic enlargement, even admitting the fact that it begins early in life, have no urinary symptoms,—certainly not to a degree requiring the intervention of a surgeon.

Now then as to palliation. Bearing in mind that a large proportion of men with enlarged prostate have no symptoms, and that another proportion of them do have symptoms, it is also a satisfactory fact, perhaps to you, certainly to me, that these can go through life with only palliative treatment, and require no operation whatever. Of course that statement is to be modified by the condition of the individual who presents himself to you, and may be modified also by the stage of the disease at which he presents himself and by its progress. You all know men who seem so immune, whose tissues are so indifferent to the inroads of microbic bodies. I have in mind a man of eighty-two, strong, looking well, who never makes a drop of urine spontaneously, but carries his catheter in his hat and in the absence of any other more suitable lubricant spits upon his catheter when he wishes to urinate. That illustrates what we know of the immunity with which a certain number of individuals can go down to their graves with easy, comfortable catheter life.

Besides palliative treatment or catheter life there is a consideration of the care of the bladder in regard to which I think we ought to say a word or two, and that is a treatment of the individual himself. If you can only impress upon such a patient the fact that he is a "*prostatic*" and therefore has a weak point, and that he ought to go to his doctor at certain regular intervals in the same way and with the same cheerfulness that he would pay his fire insurance premiums upon his house! He does not want a fire nor does he want future damage to his bladder. If he will pay periodic visits to his doctor who will overlook his bladder, many of these individuals who have been compelled to find their way to the hospital or to the office of the surgeon for operative procedure will escape it I believe. If the same attention were paid to a man who has a prostatic enlargement as is often paid to the heart of the individual who has such an organic weakness I believe many a man would live out his time with simply palliative treatment.

Dr. Cabot in his admirable résumé of the palliative treatment mentioned to you the cases which constantly arise in which the very first symptom calling the attention of the individual to the fact that he is a prostatic is retention of urine. Of course I admit that his statement is correct; that is, there is a sudden congestion. In advancing life the valves in the prostatic and pelvic plexuses disappear and there is a direct flow of blood from the rectum and associated portions of the pelvis through the prostatic plexus. Hence congestion and narrowing of the urinary outlet may easily arise, and the first symptom of a positive character,—he may have had indefinite symptoms to which he ought to have paid attention,—that calls the man's attention to himself is retention of urine. Many of these persons can be relieved without the passage of the catheter. My rule in such cases is: prone position, pelvis elevated, high enemata and simply hot irrigation of the urethra through the meatus and repeated in an hour or two. In some of these individuals you will see a little spurt of urine following the irrigation and hear a sigh of relief on the part of the patient. It does not succeed in all cases but should be tried first.

Before I ask your patience to proceed to the consideration of the operative measures for the relief of prostatic

enlargement, let me call attention to another fact. There should be a differentiation between the men whom we call among the "higher classes" and those of the lowly and poor and uneducated. If you will look over your experience with the prostatic cases and consider how many of them have been placed upon catheter life and how many of them go *comfortably* through, you will find that a certain proportion of them have that comfort, because of their comfortable surroundings, because of their intelligence, because education and whatnot have prepared in them a certain amount of tactile skill; they are able to pass the catheter and to understand your minute directions as to asepsis and the care of the bladder; therefore, a differentiation must be made between these and the men who have no education, no home, who are parasites upon the body politic, and who resort from one dispensary to another or are brought into the hospitals in a state of acute suffering. These are the individuals on whom we must attempt some operative procedure for radical relief, and this I think is the experience of all men who have hospital experience.

Now, when we come to the question of operative treatment, I find myself in a difficult position, in such a short time as this, to define to you the cases that shall be subjected to operative procedure and to which form. But, take the tying of the iliacs. I do not approve of it. I protest against it. I believe it is unnecessary. I have been told of two cases; in one whom a secondary amputation of the leg was required, and there was no relief to the urinary symptoms. He has just as much residual urine as he had at the time of operation, and now stumps about on one leg and passes his catheter as usual. The other case I heard of recently. His iliacs were tied on this theoretical belief that it would limit the growth of the prostate and cause its atrophy, and he, I am told, is just as bad as before.

Now, drainage certainly presents to us in many cases a most attractive field. The individual has no violent or dangerous attack made upon his pelvic organs, is enabled to retain his testicles, the shock is not very serious, and in many cases, I do not know in what proportion, but in some of them, perhaps many of them, after prolonged drainage there is a certain amount of spontaneous urination

and comparative comfort. I have in mind one individual whom I drained a year, and then he found himself able to urinate so readily and freely by the urethra that he requested the removal of the tube.

Drainage presents another opportunity, and that is in those acute, serious, cases where we must attempt something for their immediate relief, or soon have symptoms of uræmia because of the back hydrostatic pressure upon the kidneys. In those cases I think drainage offers to us the best means, and it is so simple that where you are in doubt I would commend it to you rather than repeated aspiration of dirty, thick, purulent urine. It can be done with cocaine anæsthesia or by a mixed fluid of morphia and cocaine whose proportions I do not remember at this moment, but it can be done very easily and comfortably by cocaine anæsthesia. On several occasions *in extremis* rather than to aspirate I have simply made use of a long trocar introduced quickly and easily by cocaine anæsthesia behind the pubes, left it *in situ*, ran a bistoury down by the side of it until I made an opening in which I could get my little finger, slipped down a drainage tube, through which urine and pus flowed out quickly and the use of an antiseptic solution followed at once. Dr. Wishard of Indianapolis tells me he has facilitated his entrance to the bladder by having soldered on the trocar two fine wires that make a sort of grooved director, and he finds that his bistoury slips into the bladder without trouble.

To prostatectomy it seems to me not necessary to pay any attention, at this time. The whole question has been ably presented, and the cases in which prostatectomy will be selected will have to be decided by the good sense, skill and experience of the surgeon.

But I wish to pay some attention in my remarks, to the comparatively new operation for the relief of prostatic enlargement by causing atrophy of the gland; namely castration. The same thing without the removal of the testicles has been attempted in other ways,—ligation of the cords, torsion of the cords, subcutaneous torsion of the cords, the idea being to cut off the blood-supply from the testicles and cause their subsequent atrophy. Another individual has lately come forward with another suggestion. I am

not prepared to comment upon it; I mention it. It may yet be found to have something of value. He suggests hypodermatic injections of cocaine solutions into the testicle itself. He gives no records, but claims that in all cases which he subjected to this treatment, twice a week for two months, there was evident atrophy of the testicle, diminution in the development of the spermatozoa, and after an indefinite time a decrease in the symptoms of urinary difficulty and great relief to the individual. I am not prepared to express any opinion upon it. But you see that the position of criticism which has been taken by certain men, particularly Bellfield of Chicago, and others, toward this operation is bringing out other facts, some physiological and others pathological, in regard to the relation of the testicle to the enlarged prostate. Being one of those who have taken a conservative and critical position in regard to this operation I think it is but fair to say that enough testimony has been advanced for me to believe that there are cases which will be benefited by the operation of castration.

Now, gentlemen, which will be the case that will be benefited by castration? I think that is the question which will be submitted to us and which we will have to consider with great care. For example, I was asked to see in consultation a man sixty-four years of age who had all the evidences of prostatic obstruction and apparently it was very large. He was straining in a most agonizing manner to expel a few drachms of purulent urine every two hours. He had a cachectic look with a bladder overdistended; and I was asked if this man was a case for castration, the surgeon having made up his mind to do the operation on a fixed day. I said I did not consider it a case for castration. His kidneys were suffering. He evidently needed something done immediately. Nevertheless castration was done, and the man died in a week. I did not consider that that was a case which should be left to the dangerous delay of atrophy, and atrophy only to be guessed at. I believe that man should have been treated immediately by drainage, and then subsequently, if necessary, or if it seemed wise and judicious, some operation for his radical relief instituted.

I was asked by a doctor to see his old father, who was suffering from retention of urine. It was as simple a thing

as could be done to pass a catheter upon that old gentleman and relieve his immediate symptom, but I was told by the doctor that a gentleman, who is an orchidectomist in my city, had said the only way to relieve the old man was to remove his testicles. Now, I claim that those two cases alone require me to take a conservative position, and demand of the gentlemen who wish to do orchidectomy upon every occasion that they shall present good and sufficient reasons for the operation, because the man who is *suffering* will accept anything. I agree with Dr. Cabot that the operation is so seductive, and relief so enthusiastically stated, that we are liable to be placed in the same position as the profession was placed in the early and too frequent ovariotomies, of which we all know. I have listened with great interest to the paper by Dr. Edes this afternoon, and especially to that part in which he called attention to the failures in those unfortunate women who had been subjected to normal ovariotomy. Do not think I am an antagonist of the operation of castration. I say there are cases in which it will be useful and proper, but they must be most carefully considered.

Now, there is something yet to be ascertained in regard to the physiology of the testicle, and also in regard to its pathological facts, some of which we heard stated at the Niagara meeting of the American Association of Genito-Urinary Surgeons. For example, Dr. Wishard of Indianapolis, a well-known and careful observer, stated that a patient whom he had castrated four and a half years ago for epithelioma of the penis had at this late day shown no evidence of atrophy of his prostate. Dr. Belfield also reported castration upon a dog, in which he had first opened the bladder to be sure there was enlargement of the prostate, then castrated the animal and no atrophy of the prostate resulted. So that there are some facts we have yet to learn, and we must bear in mind that there are some doubtful questions when we come to consider any case presented to our notice whether we shall castrate him or not.

I wish to give my friend, Dr. Keyes, full opportunity, gentlemen, and without considering this operative treatment any further I want to call your attention to a question of treatment that I believe, if we can put it upon a

sure foundation, if we can arrive at enough facts to take it from the realm of speculation, we will have settled in a very large majority of cases in the future generations this matter of enlargement of the prostate. I have no sympathy with Mr. Reginald Harrison who claims that the prostatic enlargement is myomatous, muscular. I believe the prostate is purely a sexual organ. Its health, position, function, so far as we can arrive at it, indicate that it is a sexual organ. True, from a hypertrophic enlargement of the glandular portion there may extend an enlargement to other portions of the stroma, of the muscle, of the fibrous connective tissue, etc., but I believe its origin is to be traced distinctively to hyperactivity of its function. Now, I am going to present this question to you for your consideration as intelligent men, men in earnest for the welfare of your fellowmen, and to a body of men who represent, I believe, the profession of probably the most intelligent State in our Union. I want you to observe, gentlemen, for yourselves. Collect and place upon record facts by which the future generations of medical men can at least *direct* their studies. I believe that the enlargement of the prostate is not due to senility. We have enough facts to warrant my statement. Sir Henry Tompson says it rarely makes its appearance after seventy, and when it exists it has already reached considerable proportions by the age of seventy-five. I have seen prostatic enlargement in young men of about forty. Belfield reports a case at forty-three; Dr. Packard of Philadelphia at forty-five; Dr. Mudd removed an enormously enlarged prostate from a young man aged twenty-seven. It seems to me also there is a relation between the enlargement of the prostate and the age of fertility, and now I ask your attention to one fact, and that is this, that the enlargement of the prostate begins at a very much earlier stage than we have supposed. I believe it begins during the active period of sexual life. These are facts extremely difficult to arrive at. Every man knows his own sexual history, very often to his own great regret, and it is very difficult sometimes to get a correct statement of his sexual life from boyhood upward. If you will consider the facts that come to our knowledge as confidential advisers; to begin with early life, the habit of masturbation; secondly, excessive

sexual indulgence, not the act of coitus, but that prolonged indulgence with women who permit sexual relations persisting for hours at a time, but do not permit intercourse; and thirdly, the varied excesses of married life, you will find sufficient cause for overgrowth of the prostate. In some individuals I have succeeded in getting at the inmost sexual life, and have followed it all the way up, but have not had enough cases to classify and present them to you in any other way than as a suggestion. I ask your attention to it, gentlemen, in order that in the future we may possibly arrive at some conclusion as to the *causation*, and therefore prophylactic treatment, of enlargement of the prostate.

Dr. Cabot has called attention to a question which has arisen in my own mind, and that is, what is the effect of castration upon these elderly men. In those castrated what is to be their relation to the body politic; to us? Some of them retain their power of intromission, sexual desire, but of course are not fertile. I think all these questions we as reasonable men, as scientific men, should consider as bearing upon the questions of good morals.

Dr. Edward L. Keyes, of New York City. — On reading the title of the discussion by Drs. Cabot and Watson, I concluded that its whole drift would hinge upon the question of the progress made in treatment, and I judged that it was to be the operative treatment; and whatever thoughts I have had upon the subject, and whatever ideas to present to you, were all centred around that focus, namely, the advances made in operative technique; but the discussion has turned entirely in different directions, and very little or nothing has been said upon this point. Perhaps I would better therefore confine myself to what has been gone over; but as I have brought a few specimens I may be allowed to touch both sides.

The very judicious and balanced presentation of the subject by Drs. Watson and Cabot I have nothing to say about; I give my assent heartily to the proposition that in any case, so far as catheter life *versus* operative treatment is concerned, the former should be presented and urged upon any one going into prostatic life, and he should not be

tempted to undergo any operation whatsoever. This, when practicable, is the best way to treat prostatic enlargement, because it is the safest. If a patient uses his catheter properly, and understands how to manage his bladder, he will get on. Pitha's case, a man who had depended for urination entirely upon the catheter for forty-five years, is sufficient to point the moral. I had a patient who urinated exclusively through the catheter for twenty-one years, and when a man does not begin to use the catheter until after fifty if he goes twenty to thirty years longer he should be content. The least mortality given for orchidectomy — seven or eight per cent. — is to be thought of seriously in connection with the choice between catheter life and operative effort at cure.

Allow me one correction in the method of instituting catheter life, which Dr. Cabot quoted from me. I have changed my mind since I wrote what he quoted. Corrosive sublimate I still use. I have given up carbolic acid long ago. I do not like it; it is irritating; it does not destroy most bacteria until used in a five per cent. solution, which cannot be tolerated by the bladder. Corrosive sublimate is very much better as a paraciticide and antiseptic, but is often exceedingly irritating to the bladder. A 1 to 12000 solution I have known to cause a cystitis that lasted a week. This is a serious bar to its routine employment. I constantly use it in the urethra. The urethra tolerates it much better than the bladder. A 1 to 8000 solution is not too strong in the urethra, but I am very prone to use salicylic acid, one half grain to the ounce, which does not irritate. A solution of it can be easily kept. One grain of salicylic acid will dissolve in a drachm of alcohol. One half grain of salicylic acid to the ounce is strong enough, and one drachm of this solution in two ounces of water is just as good as Thiersch's solution; with it I flush the urethra constantly in instituting catheter life. And I always entirely empty the bladder at the first sitting, slowly, pinching the catheter, feeling the pulse, having the head low. I wash the bladder on the first occasion with 1 to 4000 silver nitrate solution. That will destroy any bacteria which one may have introduced into the bladder. If the urethra is flushed with salicylic acid, one half grain to the

ounce, as the catheter goes in, if the catheter is immaculate, if the bladder is emptied slowly and flushed out with 1 to 4000 nitrate of silver solution and a little sterile salt solution left in, I believe no harm can come. I don't know what I shall do when I come to a case in which the bladder holds a gallon. I have no hesitation now in attacking any case of thin-walled bladder with enlarged prostate, which is the worst kind, that holds a quart, and I feel that I can put that man in ten days into catheter life with a sterile bladder if his prostatic urethra be not in a catarrhal condition from the start; that is, if the first time the catheter goes in it brings no blood upon withdrawal. If you produce traumatism, if there be stricture, much catarrh, granulations of the urethra, then it is vastly more difficult to institute catheter life without starting up a certain amount of catarrhal cystitis.

Now, perhaps I may turn to the subject I was intending to speak about, and mention the choice of operation. It seems to me if a man has come to the point of accepting prostatectomy, and is to have his prostate taken out, the choice of operation is exceedingly easy. If he has a prostate as large as an orange, considerable peripheral enlargement, it should be taken out, I think, above the bone. If he has practically no peripheral enlargement or a moderate amount, and still a considerable amount of deteriorative symptoms due to the prostate, I think he should be attacked through the perineum. This point is exceedingly clear in my mind; the mortality through the perineum is less. The method I use has not been referred to by Dr. Watson. I do not know that I have ever described it. I have used it several years. In attacking the prostate without peripheral enlargement I prefer to go through the perineum to the apex of the prostate. With a probe pointed straight knife in the bladder and one finger in the rectum, I cut down the neck of the bladder laterally toward the finger, cutting entirely into, perhaps two-thirds the way through, the prostate. I then wash the rectal finger with permanganate of potash and oxalic acid, and proceed with the rest of the work. Then putting the finger into the slit one appreciates what is the matter. It may be a bar, may be a prominent piece of one side or the other, or it may be a projecting

third lobe. If there be a third lobe get it off by making another cut. Lately I have found another method which succeeds so well I shall try it in the future. It was a case of third lobe, which stuck up into the bladder three-fourths of an inch. I made the incision, and by a lateral movement of the finger the whole thing came off with a projecting tongue of mucous membrane running down along the floor of the prostate. The whole operation was done in ten minutes or less. The temperature never went above 100°. The rest of the prostate was smooth and normal. Recovery was prompt and perfect. The method I usually use is to cut out a V-shaped piece if there be a third lobe. If there be a bar I have an instrument which is put in shut, turned to one side, opened, and then by a little pulling backwards and forwards shut so as to cut out a considerable oval-shaped piece including the bar, making a distinct groove in the bottom of the prostate. If this method of pressing out with the finger a piece of the prostate can be done it will be the simplest operation, and it is very desirable in these old cases not to prolong etherization. Yearly as I go on I use less ether and more chloroform, and operate as quickly as possible. This operation can be done in ten minutes perhaps. A small amount of anæsthesia is very desirable in cases of damaged kidney, and the old man's kidney is habitually damaged. The old method was to cut off the projecting portions with the scissors, and the methods I formerly used were to cut off with curved scissors first one side and then the other, and slip out a triangular bottom piece, packing when the hæmorrhage was excessive. The operation I now do above the bone has recently been described at Niagara Falls by my associate, Dr. Fuller, who has perfected it and practically developed it in operative technique. The operation is exceedingly simple; it is all done in the dark at the bottom of a well of blood. One never sees anything after the first incision. The finger is carried down behind the bar into the bas-fond. Upon this with a scissors curved on the flat the bar is cut clean through until you get to the bottom of the bas-fond; with the finger you now commence and dissect off the bladder in the depths at the bottom of a pool of blood and work the finger about in all directions well forward under the bone until you can

entirely shell out the prostate. The mucous membrane generally tears a little, but that makes no difference. I think it is better than cutting into the lateral lobes, because if you cut laterally you have pouches that do not drain. With a central cut your pouch drains backward, the best possible exit. By this method you may gouge out and draw up and pull away first one side and then the other in a very few minutes. This is a method of enucleation through a supra-pubic opening, and is eminently adapted for use in very large prostates.

Another operation, which has also been used largely and advocated by Dr. Alexander of New York, is that through the perineal opening. It is not to open the mucous membrane of the prostatic urethra at all, but through the perineum by combined pressure through a supra-pubic opening to enucleate the prostate. I have generally preferred to go in front through the bar, make an incision and eviscerate laterally. In a thin man it is an exceedingly simple operation and pretty rapid. I have never done the combined operation which Dr. Alexander does.

I wish to say a few words about orchidectomy. Everything that is new has a glamour about it, and is fortified by the faith-cure element which makes it advance at a more rapid rate than it deserves, and then it swings back too far the other way. I belong to the conservative group to which have attached themselves the three former speakers. But by no means do I believe that this operation is without merit. The emotional side, or æsthetic side, or poetical side of this question only exists in the imagination, because, when the prostate is eviscerated from within, or cut away freely, certainly the ejaculatory ducts are torn away and necessarily included in the scar, and the man is nearly as much a eunuch from this operation as from the removal of the testicles. It is a matter of sentiment, but still I think without sentiment we should return to our original condition of barbarity and tear each other's throats. Sentiment is life. I very much respect the perhaps very rank and crude expression of virility one old gentleman gave to me when I suggested orchidectomy to him as a possible means of relief. Said he: "No, doctor, I'll be damned if I do. I will die with 'em." Still that is neither here nor there. I never

have done this operation but once and I don't care to speak of the experience of others. These experiences are in print, and the only possible objection is that the greater number come from people who have no other claim to credibility than the fact that they write, that is, the majority of the reporters. If not a majority, at least many of the reporters are not skilled observers. A man in some obscure western town reports some seven or eight cases all getting well in a few weeks, skipping about, and one declaring that he wished he had got rid of the "damned old stones" before, because he was so much better sexually after their removal. That sort of case leaves an honest man permission to doubt. But there is something in it, how much we shall soon know, because everybody is doing it, and it is being done too much. I have offered the operation to a certain number of people, discussing the question and placing it before them, and I never have yet found anybody in the past year since the case of Smith willing to try it until finally, one day about two months ago, a handsome old gentleman came in and asked me about it. He said he had come to have the operation done. He was a bachelor about sixty-five, and apparently in very good health. I had encountered him with suppurative testicle many years before, in connection with the use of a catheter not sterilized. Then I had seen him a number of times at long intervals with slight attacks of recurrent prostatic suppuration in a mild catarrhal way, giving vesical spasm, never laying him up. He came back with another of these attacks, said he was getting rather tired of it, had to use his catheter every four hours, and he was getting another attack. He wanted to have his testicles taken out; said he had a relative studying medicine who told him about it, and he was full of the idea. I thought it better to get rid of the commencing attack before taking the testicles out. He said he had not used his testicles for years and never intended to again. I told him I thought it best to try the old way and see if I could not get the bladder into a condition of quietude before operating. I tried a few times and failed to make any advance. I think it is not proper to take out the testicles in a condition of advancing catarrhal disturbance at the neck of the bladder. This patient over-persuaded me and

I took out his testicles under cocaine. He said it did not hurt as much as when the abscess was opened years before. His spasmodic calls to urinate continued with the same violence; the bladder was irrigated each time the catheter was used, about every three hours. He had no stone, no tumor, no ulceration, nothing in the bladder, a moderately enlarged prostate and a moderate amount of catarrhal cystitis in the prostatic sinus. He was somewhat of a bleeder. A little oozing formed a clot in the scrotum, and one side was opened the next morning and a moderate clot turned out. Nothing happened to the wound and nothing to the operation. But he continued to strain with increasing violence. Then I insisted that the bladder should be drained. He would not hear of it. The family also objected. About the end of the first week he strained out a hæmorrhoid which became strangulated and œdematous and from that a slight erythematous blush and a sort of ambulatory erysipelas ensued. He strained and strained and strained his life out; he died in the fifth week. The bladder never cleared up. I searched again and found nothing in the bladder. No autopsy was allowed. The catheter finally was tied in for a week, and that made matters worse. He strained all the time. The catheter was taken out and passed every two hours, twelve times a day, and between these two hours he had habitually three intense spasms so that I made out that he had forty-eight intense vesical spasms in the course of twenty-four hours, and he finally died, not allowing himself to be drained. There were consultations held, but nobody would uphold me in insisting on drainage. Still I do not condemn the operation. I do not know enough about it. But it seems to me that on many accounts it is best to withhold judgment a little while and go slowly, and certainly not to operate on a man who is in a condition at all of urgency or emergency or progressive vesical spasm even if just commencing. He should be operated on in periods of quiescence or periods of decline, because the operation does not always produce this immediate relief which we are led to expect when we read the brilliant articles where the relief commenced the third day after the operation.

Dr. Abner Post, of Boston.—When a man is called upon to continue the discussion at the end of two and a half hours, and as a fifth speaker, the first kindness he can pay his audience is to tell them he will detain them but a very few moments.

I cannot believe that the operation of orchidectomy, as my learned friends have chosen to call it, is to entirely supplant all other operations. But it is the operation which at the present moment especially attracts our attention, and the few words that I shall say this afternoon will be in reference to that part of the discussion, and in order that I may be sure not to repeat what the gentlemen have said before me I will confine myself by your consent chiefly to my own experience in the matter. I have castrated two men for enlarged prostate and have advised as a consultant the operation in a third patient. My own patients are somewhat interesting.

The first was a man of seventy-six years of age, who was under my observation for two weeks before the operation was done. He was entirely unable to pass his urine himself, was obliged to be catheterized not by himself, but by an attendant, catheterization five times in the twenty-four hours being a necessity and keeping him barely comfortable. He was constantly begging for the use of the catheter. His pain and discomfort were very great. He was a feeble old man, was confined to bed, and his complaints in regard to his head were very great. He kept informing us that he should go crazy if he did not have relief from his bladder, the irritation was so persistent and so excessive. Treatment in hospital in bed with careful systematic catheterization and washing of the bladder, for his urine was also purulent, failed to give him relief; and at the end of sixteen days, in spite of a general febrile condition, I castrated. I cannot say that I had any great hopes of relief or that I urged the operation. He and his friends would have consented to it long before I did it. At the time of the operation I told them what I believed to be true, that the operation would I thought in itself prove of comparatively little moment, and that there was little danger of death as a direct result, and that in his case it was certainly worth an attempt to give him relief. The castration was done with

a minimum of ether and with the greatest rapidity. I do not remember exactly how long the operation itself took; it was but a very short time, but from the moment the ether was put over his nose until he was back in his bed in the ward was something like thirty minutes. I was surprised in the afternoon to find the old gentleman in a state of extreme danger, with a temperature of 104° and a pulse of 150, and I thought I had certainly killed him. The next morning, however, he had recovered, and he is to-day an example of the beneficial effects of the operation, which was done nearly three weeks ago. He can at present pass a fair amount of urine. The greatest amount he has passed is something like five ounces. He does not empty his bladder; there is still residual urine. There is still pus in his urine. He has to be catheterized once daily. His mental condition has changed wonderfully for the better. He is greatly encouraged, feels happier, sits up two or three hours at a time. The operation in his case is certainly a success. It has not restored him to youth; it has not entirely restored his bladder; it has restored him to a condition where he is partially independent of the physician. I cannot help thinking that he rejoices in the way that patients often do over the result of an operation, and that his mental condition is an extremely favorable one towards the operation, so that he is inclined to exaggerate its effects. He is quite garrulous in regard to it, and advises a repetition of the operation to every old gentleman similarly affected.

My second operation was in a man of fifty-nine. The prostate in his case was not very much enlarged as felt through the rectum, but there was a distinct bar at the neck of the bladder to the entrance of the catheter. He was obliged to pass water every hour. His amount of residual urine was something like six ounces. He asked for the operation. I should not have suggested it to a man of his years and with his general condition. It seemed to me there was probably some other factor which entered into the frequent urination. I kept him a fortnight before operating. I could not find any satisfactory explanation of his frequent urination short of the prostatic trouble. I castrated him about the same time as the first man. The opera-

tion proved in him a mere bagatelle, followed by no rise of temperature. I cannot feel very certain by my finger of any diminution in the size of the prostate, but his intervals between urination have increased decidedly, so that the average is two hours instead of one. He often goes three and a half hours. He does not entirely empty his bladder. There is something like one half of the former amount of residual urine, but a good amount of the pain and discomfort now, he says, has disappeared. I must say that he expresses himself a good deal more favorably in regard to the effects of the operation than seems to me to be justified.

In the third case in which I advised its performance, I know the operation has been performed, but I have no details since. I mention these cases because I think they will show fairly well something of the risks, and the fact that the brilliant cases must go side by side with those which are less brilliant. I speak of them more particularly to introduce another small series of cases in which I have refused double castration, and it seems to me that those are more important for a moment's consideration than the cases in which castration has been done. Gentlemen have reported the cases in which they have performed castration, but have not reported the cases in which they have refused. The cases in which I have advised against castration are:

First, the cases which are comfortable with the catheter. The gentlemen who have preceded me have agreed that the catheter life, such as we have depended on before, is still to be depended on, and these were cases who could pass their own catheters, and cases in which it was improper to advise an operation, which, looking at it in as favorable a light as we can, I think we must still consider as questionable in its results.

Second, were the cases of moderate age. I have now a gentleman of fifty-seven who has a well-marked prostate, who is practically dependent upon the catheter, who expects to be married during the coming summer, and I did not feel that a case of that sort was one in which castration should be advised.

A third class of cases, of which I recall two at the present moment, are cases in which the prostatic disease seemed

only a minor incident in the degeneration of old age. There was one old man transferred to me at the hospital from the medical side. He had entered the hospital I hardly know for what, but it was found that he had an enlarged prostate and a certain amount of residual urine, and an operation was suggested. Really in that case, although he certainly had an enlarged prostate and did not empty his bladder, that seemed to me only an incident. His greater trouble was the feebleness and stiffness due to old age, and I could not imagine that he could really be benefited by it. He was not even in a condition in which the actual use of the catheter was a necessity. Fourth is a case in which there is marked disease of the kidneys, in which it seemed to me that was of more importance than the prostatic disease itself. Fifth is another case in which the pain connected with micturition, etc., was extreme; it suggested something more than an enlargement of the prostate, with its attending evils. It was excessive. The patient finally got so that he used ether, or wanted to, every time he passed water. It seemed to me that that was an improper case for castration; in the first place, because the relief to be given that man must be immediate, and I recommended and carried out perineal drainage, as mentioned by Dr. Bangs. There was another reason for doing that. His symptoms were exceptional, and it seemed to me there must be some other explanation, and it was necessary to explore in some way the bladder. A stone-searcher could not be entered, and after the perineal incision it was with the greatest difficulty that I entered my finger. There was no stone, and I could not make out malignant disease of the prostate, but the post-mortem examination showed that there was malignant disease of the bladder. It was spread over the walls of the bladder, starting from the prostate, but involving rather the walls of the bladder than the prostate itself.

There is another case in which I have refused to operate because of double inguinal hernia. It seemed to me that the additional gravity involved in that case is sufficient to rule out the operation.

With these exceptions to the universal application of castration, and doubtless there are others, it is plain that there is still field for the other operations which have been men-

tioned so favorably and at such length. There is one thing more I want to say in regard to the matter of castration, and that is the temptation to do it loosely and without proper regard to the individual patient is extremely great. It is so easy to consider any old gentleman who has trouble with his urine as a prostatic and to proceed to castration, that the temptation to superficial work is extreme, and I perhaps may be excused if I make mention of certain cases which I have myself seen regarded as prostatic when really disease of the prostate was absent. These cases include, in the first place, cases of deep stricture. I have seen one or two cases of deep stricture which certainly presented the ordinary symptoms of prostatic enlargement, occurring as they did in men long past sixty. I have seen one or two cases of locomotor ataxia with marked bladder symptoms where I thought really a person might be excused for thinking at least of prostatic enlargement. At times it is extremely easy to mistake cancer of the prostate for chronic enlargement, and I can remember at least one case where there was a difference of opinion as to whether there was cancerous disease or not, which was settled only by post-mortem examination. And I have an idea that I have seen certain cases of rectal disease in old men which also so interfered with the bladder function that it was possible to consider them as cases of prostatic disease.

One might almost say that it is more necessary to be careful about diagnosis in cases of castration than when some other operation is proposed. The operation through the perineum or over the pubes allows direct access to the prostate, and we are able to correct our diagnosis and adapt the operation to the condition present, but castration is done at a distance from the seat of disease, and after it is over we know no more about the actual condition than before.

Without going further into the subject, let me condense what I have tried to say by simply repeating that, while castration promises so much in certain cases, it is by no means a cure-all, and is not to be entered upon rashly nor without proper consideration of the individual case, and above all not without a careful diagnosis.

Dr. Gardner W. Allen, of Boston.—I should like to speak very briefly of a point in diagnosis which seems to me important, although it probably concerns only a small number of cases. This matter was especially impressed upon me at the recent meeting of the American Association of Genito-Urinary Surgeons at Niagara Falls, by Dr. Belfield of Chicago, who called attention to some of the consequences of careless and hasty diagnosis. He mentioned cases which presented the ordinary symptoms of enlarged prostate, and had been treated as such before coming under his care. Examination showed the trouble to be due to inflammation of the prostate and its appendages, especially the seminal vesicles which were swollen and distended with fluid, forming a large part of the tumor which had been mistaken for hypertrophied prostate. One of these cases had been castrated without relief at the end of two months, but had begun to improve on stripping the vesicles; it was too early, however, to give final results. Dr. Belfield thinks that although there may be some enlargement of the prostate in these cases it is due to inflammation and not to hypertrophy, and is best treated by milking the prostate and its appendages by means of a finger in the rectum.

At the same meeting Dr. Fuller of New York exhibited some photographs of dissections which showed in a beautiful manner how the distended vesicles may simulate enlargement of the prostate.

I have observed this condition not infrequently, and have in mind one case in which a diagnosis of enlarged prostate had been made, both lobes being apparently greatly hypertrophied, forming conical tumors with a deep sulcus between them. When the vesicles had been emptied the prostate was found to be of normal size and form. It seems to me that this matter deserves a place among the numerous factors that are to be borne in mind in the study of prostatic enlargement.

ARTICLE XX.

ANTITOXINE IN DIPHTHERIA.

THE ETIOLOGY OF DIPHTHERIA AND THE USE OF ANTITOXINE.

By HAROLD C. ERNST, M.D.
OF BOSTON.

THE PATHOLOGY OF DIPHTHERIA.

By WILLIAM T. COUNCILMAN, M.D.
OF BOSTON.

THE PREPARATION OF DIPHTHERIA ANTITOXINE.

By JOSEPH L. GOODALE, M.D.
OF BOSTON.

THE CLINICAL USE OF ANTITOXINE.

By W. HALLOCK PARK, M.D.
OF NEW YORK CITY.

READ JUNE 12, 1895.

A FEW GENERAL CONSIDERATIONS ON THE ETIOLOGY OF DIPHTHERIA AND THE USE OF THE ANTITOXINE.

BY HAROLD C. ERNST, M.D., BOSTON.

The etiology of diphtheria may be said to be so firmly settled at the present time that it is not necessary to rehearse the proofs that have been brought forward to demonstrate it; but the difference between diphtheria and those processes that resemble it do not seem to be any too clearly impressed upon the minds of the general profession.

The recent advances in our knowledge of the infectious diseases have not met with ready belief, possibly because of a lack of understanding of the changes that these advances impose. It is not an easy matter to learn that not all processes presenting similar clinical pictures are due to the same cause; and it appears to be equally difficult to bear in mind that entirely different series of phenomena may be produced by the same infective agency, acting on individuals with different personal peculiarities, and even in the same individual in different localities.

Now the recognition of these facts and the bearing them constantly in mind is absolutely necessary for understanding the present position in regard to the etiology of diphtheria. This disease is no longer to be considered to be one set up usually in the throat, to be detected by a certain definite chain of symptoms, but the name must be confined to that series of changes in which the bacillus first seen by Klebs, and first studied by Löffler, is active as a causal factor.

The history of the long series of experiments by which this has been established would be tedious to rehearse in this place, but since the very beginning, with the publication of Löffler's work, the evidence has been accumulated, until now there can be no doubt of this fact:—that the bacillus frequently called by his name is the cause of by far the larger number of cases having the clinical aspect of diphtheria, and that, therefore, this name should be given to the processes set up by this bacillus and to none other.

At the same time, it should be very carefully borne in mind that there are other changes, occurring not infrequently, that resemble diphtheria as thus defined very closely, and that at present are indistinguishable from true diphtheria by any practicable test but that of the cultural examination. Practically such cases may be just as severe and probably just as infectious as true diphtheria, although not usually so, so far as my knowledge extends; but this fact does not in the least lessen the importance of an exact diagnosis; it should rather serve to arouse an increased enthusiasm in the study of what these other processes are.

The facts being these, it is natural that the question should be asked: "what difference does it make if my patient has a 'bacillus' sore throat, or any other kind of sore throat, if the clinical picture be the same"? But such a question can hardly be repeated in earnest after the events of the last year. Of course it makes as much difference as it does whether it be true tuberculosis or not in a person with a destructive process in the lung.

We are supposed to be entering upon an era of "specific" medication based upon the knowledge gained by our studies of the bacteria and other micro-organisms; and surely, if specific treatment is to be carried out, a specific diagnosis must go hand in hand with it. This may appear to be an unnecessary reiteration of facts known to us all, but these facts are not always borne in mind,—the best example of

what I mean being found in connection with the disease under discussion to-day. It is the custom abroad, in many of the hospitals, to inject *all* cases of sore throat with the antitoxine of diphtheria, without waiting for the result of the cultural diagnosis; and from one point of view, this method of procedure is perfectly justifiable and has been adopted at least in some instances in this country. It is right to do this, for the reason that all experience and analogy show that the earlier the antitoxine is used the better the results; and the claim is still made in Berlin that no case has been lost when the injection has been made on the first or second day of the disease,—of course, after that time the mortality increases. If, as it is supposed, the antitoxine has no deleterious effect in non-diphtheritic cases, then, of course, no risks should be run by delay in its administration. On the other hand, it is difficult to see how the antitoxine can have had a beneficial effect in cases of recovery in non-diphtheritic cases in which it has been used. It either is or is not a specific against diphtheria, and so far as we yet know it has no specific action upon the bacteria or their products that are concerned in the production of the non-diphtheritic processes in the throat. We must conclude, therefore, that in the cases in which its use has apparently been beneficial the results are merely coincidences, or else true diphtheria was present after all.

This conclusion seems necessary, for the reason that the whole of "serum-therapeutics" depends upon it, for which statement some explanation may be found in the lines of modern research. These are almost wholly towards the question of immunity. What this is supposed to be it is not necessary to discuss at length, but we may recall that there is a "natural" and an "acquired" form; the former existing in certain races of animals or in single individuals of a race, rendering them insusceptible to the attacks of certain infectious diseases. The latter is the insusceptibility

to a second, acquired by individuals who have passed successfully through a first attack of an infectious disease, and is of very varying duration.

Now it has been known for some time that this acquired immunity may be artificially induced in animals by varying procedures connected with manipulation of the bacteria or their products, or, occasionally of the animals themselves. Of course, the discovery of the possibility of successfully accomplishing this object in a manner free from danger was, to the medical man, like a burst of sunlight through a fog to the sailor; and the literature of modern experimental medicine is largely made up of the record of efforts to this end. Thus far, diphtheria is the disease in which these efforts give the greatest promise of success, but at the best this success cannot be said to be complete until some better means of preparation and administration has been devised for the remedy used.

The exact methods by which the antitoxine is produced will be treated later; the consideration of the steps that have led up to its use at all may, however, be of interest, and these steps include all of those that have been taken in the attempts to secure the artificial immunity just spoken of.

The theories of the causes of immunity are many, and we do not yet know whether one or all of them are to be considered active in producing the result; the truth appears to lie between the extremes, and the facts seem to show that immunity can be explained only by a combination in varying degrees of activity of the several causes that have been suggested, and that at one time one of these is the more prominent, and at another time, or in other individuals another takes the more prominent part.

The important theories that have been advanced to explain the production of immunity may be briefly stated as follows: First, and especially upheld by the French, is that of "phagocytosis," due, so far as its elaboration is con-

cerned, to Metschnikoff. According to him, the phagocytic power is exercised by the leucocytes, of which he distinguishes several varieties. The *lymphocytes* are small leucocytes with a large nucleus, that are surrounded by a small quantity of protoplasm; they are very numerous in lymph, and present all degrees of shape in their transformation into large leucocytes called *mono-nuclear leucocytes*, whose nucleus is frequently in the shape of a kidney or bean. The *eosinophilic leucocytes* of Ehrlich have a lobulated nucleus, and their protoplasm contains certain granules that stain intensely with the acid aniline dyes, especially with eosine; they are supposed to develope at the expense of the bone marrow. The most numerous of the leucocytes are called *polynuclear*, for the reason that their nuclei are most frequently separated into several parts by exceedingly fine lines of division; their protoplasm contains granules that most frequently stain with a mixture of the acid and basic dyes only, and they are therefore often called *neutrophilic* leucocytes; they develope in the blood from the small cells furnished by different organs. All leucocytes throw out protoplasmic appendages that enable them to move, but not all of them are capable of englobing foreign bodies, that is to say of "phagocytosis"; this property belongs only to *mono-nuclear* and *neutrophilic* cells, and permits them to englobe the bacteria with which they find themselves in contact, and these bacteria are often englobed in the living condition. This property of englobing and destroying virulent bacteria has been said by one set of observers to be the cause of immunity; but many experiments, those of Charrin especially, have shown that there occur substances, in the fluids of immunized animals, that modify the bacteria and their action, independent of the presence of the leucocytes, showing that phagocytosis cannot explain all the phenomena of immunity at all times.

The bactericidal power of the blood-serum is another of the causes of immunity that has been put forward. Grohman and Fodor first demonstrated that when bacteria were grown in the blood their vitality was diminished, but the final result of the work of Buchner, Ogata, Lubarsch, Nissen, Hankin, and many others, is to show that the destruction of the bacteria in the serum is much more active out of the body than in the vessels; if the cells and proteid materials of defibrinated blood be allowed to settle, the bactericidal power is found in the sediment and not in the serum; when the leucocytes remain intact outside of the body, the serum is not bactericidal, but becomes so when the white globules are destroyed. As a conclusion from all the work upon this line of research, it would appear that the phagocytes destroy the bacteria by digesting them, and that the feeble bactericidal power of the living serum exists as a result of the breaking up of some few phagocytes in the body (Cheron).

Third, and most important to our present subject, is the theory of the "antitoxines," claimed by the French to be a rejuvenation of the old theories of Chauveau. These antitoxines have been worked out for but a few diseases at all, and farthest in diphtheria, and we do not even yet know precisely what they are.

One theory of their formation is this: The bacteria produce, during their growth, a new compound, a toxine, which is hurtful in varying degrees to the tissues in which it is formed, and which excites a new functional activity in the tissue cells. This new functional activity results in the secretion by these cells of a new product that has a neutralizing effect upon the toxine. This process goes on in all cases of diphtheria, for example, and as the formation of the neutralizing substance progresses more rapidly than the production of the toxine, recovery occurs; and, on the other hand, if the toxine is produced sufficiently to prevent

the appearance of the new functional activity of the cells, recovery does not occur. Precisely how the neutralizing effect of the antitoxine takes place is not known. It is not by a direct chemical action, at any rate in tetanus, for it has been shown (Buchner) that a prolonged contact of the tetanus toxine with the antitoxine does not destroy the former. It would seem, therefore, that these two substances are antagonistic only in the sense that one—the antitoxine—deprives the tissues of their receptivity for the toxine. However that may be, the experimental evidence shows conclusively that it is possible to produce an immunity to an infectious disease by artificial means, and that this immunity may be produced in various ways.

The attempts to secure immunity have been carried on for years; they were begun before the object aimed at was even fairly understood. From the substitution of a milder disease for a malignant one of the same type, as is done in vaccination against small-pox, the chain of experiments has extended through the use of the various forms of attenuated virus and bacterial products to this last one which gives so much promise. The use of the serum containing the antitoxines is but the natural growth along the line in which experiment has been directed since the study of the bacteria began under modern conditions, and the whole history is better illustrated in the case of diphtheria than in any other disease. Beginning with Löffler's cultivation of the bacillus (1883), our knowledge of the etiology and management has steadily advanced. Roux and Yersin marked an epoch by their classical monograph, clearing up many things from a clinical standpoint and emphasized by their hospital statistics the need of a greater reliance upon the bacteriological diagnosis. These authors, with Frosch, showed that the bacilli are not always confined to the seat of the local manifestations, but are frequently distributed, although often in small numbers, throughout the internal organs.

Brieger and Fraenkel (1891) began the special study of the toxine. Wassermann and Proskauer (1892) apparently isolated it, although Fraenkel failed to secure any immunizing results with the dry powder of this substance. Behring began in 1891 his investigations on diphtheria, which apparently led the way to what has already been spoken of as a "System" of Blood-Serum Therapeutics. His enthusiastic work, together with that, among others, of Wernicke, Aronson, Ehrlich, Kossel, Wassermann and Roux, have led us through the slow and dangerous immunizing of the lower animals, by means of the cultures and toxines of the bacillus of diphtheria, to the rapid and safe immunity following the use of the antitoxine contained in the serum of immune animals.

It is this point that we have now reached; that we *have* come thus far, all the evidence tends to show, although no one should suppose for a moment that there has been discovered a remedy for all stages of the disease. Nor should the general profession feel that the end is reached; much more is to be done before it can be said that more than a beginning has been made. We know that the serum of immune animals, and even the milk of some of them, possesses this mysterious property of neutralizing the effect of the poison elaborated by the bacillus, but we hardly know anything more. This is notably the case as far as regards the dosage and the methods of testing the strength both of the toxine and of the antitoxine. The standard, or rather the standards of the Germans appear to be unnecessarily complicated, and my personal experience has been such as to emphasize the difficulty of carrying out the comparatively simple method of Roux. Because of what I believe to be the unavoidable variability of the standards employed, there cannot be any exact dosage given, and it is fortunate that a few cubic centimeters in excess does not make any practical difference, so that, given a specimen of antitoxic serum, a

slightly larger quantity than that directed may be used with safety. Something may be hoped for, in the direction of exactness, by the method of evaporating the serum to dryness and then testing its power, but even this is but a makeshift, as compared with the chemical accuracy possible in the management of the known compounds. We must look to chemistry for aid in this direction, and some method of extracting the antitoxine must be devised before we can face the problem of exact dosage with any prospect of its proper solution.

The results of the practical application of the facts that we have learned will be stated by those following me this morning, but there are a few points that I may speak of before closing.

As is fairly well known, the bacteriological diagnosis of diphtheria has been made for the general profession for some time at the Harvard Medical School, in the Bacteriological Laboratory. For over a year it was done by us — mainly by Dr. McCollom — as an experiment, for the purpose of testing its value and the desire for such an investigation by the medical profession. Systematic work of the kind, however, was first done in this vicinity at the Boston City Hospital, and of course is still carried on there. Since last fall we have acted for the Boston Board of Health, and for many of the communities lying in close proximity to us, and, so far as we can judge, there is a constant increase in the importance attached to this method of diagnosis. Since the first of November, 1894, there have been sent in nearly five thousand cases for diagnosis, and in the neighborhood of one thousand for re-examination. Of course all of the primary examinations are voluntary on the part of the physician, and would hardly have been sent if there had not been much reliance placed upon the method. We are not able to follow each case, but where inquiries have been possible the results have even surprised ourselves by their

accuracy. Of course nothing is infallible, and here is no exception to the rule, but there has not yet been given evidence to show that this is not by far the most accurate method of diagnosis at our command. Whether due to the wide use of this method and the consequent detection and isolation of otherwise unsuspected cases, or whether due to this in connection with the systematic inspection of the schools, certainly the great epidemic of diphtheria in Boston this last winter has diminished in a very gratifying manner. The disease was at its highest at the beginning of the systematic use of the bacteriological diagnosis and the inspection of schools, in December, 1894. From that time, month by month there was a steady fall, sharper than occurred in previous years, until the slight rise that apparently always appears in May just before the schools are closed for the summer.

Of the inspection of schools, it may be said that it has happened more than once that a child has been sent home for a slight sore throat, and that cultures have shown the presence of virulent bacilli from one to three days before the clinical diagnosis of diphtheria was in any way justifiable, so that it would seem advisable for the cultural diagnosis of diphtheria to become even more a matter of routine than at present.

The preparation of the antitoxine of diphtheria is a matter of so much importance, requiring so much special knowledge, that we are especially fortunate in this State in having the supply under proper control; that for the City of Boston is at least in part provided for by the City Board of Health,— that for the State outside of the city by the State Board of Health.

THE PATHOLOGY OF DIPHTHERIA.

BY WILLIAM T. COUNCILMAN, M.D., BOSTON.

In speaking to you on the pathology of diphtheria it is impossible for me to give any new facts, or even to present the subject in a new way. Diphtheria to-day is probably the best known of any of the infectious diseases. Even in tuberculosis there are more problems to be solved by investigation. No other disease illustrates better how much a knowledge of the ætiological factor has served to clear up the obscure points, both in the pathological anatomy and in the clinical features. At present the only obscure points in the pathology of the disease have reference to general pathology, and apply to other diseases as well.

By diphtheria we mean a disease produced by the action of a bacillus with definite morphological and biological properties which distinguish it from other micro-organisms, and which is known as the Klebs-Löffler baccillus. The anatomical lesions of the disease produced by this organism vary so much in their character, situation and extent, that these alone are not sufficient to characterize the disease. Moreover, similar anatomical lesions may be produced by the action of other causes. Usually, in every disease due to a definite cause, we are able to recognize the character of the disease by the character of the anatomical lesions produced by the action of the cause. In tuberculosis, for instance, we find certain alterations of tissue which are due to the action of the tubercle baccillus, and which have the same general character whether found in man or in animals.

In other diseases, particularly in those in which the lesions have the general type of inflammation, similar lesions may be produced by a variety of causes. The recognition of the ætiological factor thus becomes the only true basis for a scientific nomenclature of disease. It is also of the greatest practical importance for the hygienist and the clinician that the ætiology should be made clear. Similar lesions, as we have said, may be produced by a variety of causes. In one case by an organism having little power of infectiousness when transferred to another individual, in another by an organism which under almost all circumstances carries with it the power of infecting other individuals. Treatment and hygienic measures based on a recognition of the cause are more intelligent and more efficacious than when simply directed against the lesions or the clinical symptoms. In diphtheria a special method of treatment has been found which is efficacious only against the conditions produced by the diphtheria baccillus.

In the pathology of an infectious disease we have to consider lesions of various sorts. In the first place, there is some point where the tissues have been invaded by the organisms and where lesions due to its direct action on the tissues will be produced. These are primary lesions of the disease. From this place the organisms may be carried to other parts of the body either along the same surface or by means of the blood or lymphatic circulation, and lesions similiar in character may be produced in remote parts. In certain diseases which are distinguished as the toxic infectious diseases, and the best types of which are found in diphtheria and tetanus, certain coluable chemical substances are produced where the micro-organisms are localized, and these are absorbed and produce various lesions, some of which can only be recognized by the disturbances of function which they produce; others are apparent on careful examination. A third class of lesions may be produced by other organisms

than the one causing the disease. These find in the primary lesions conditions favorable to them, and by their action may intensify the primary lesions or affect other parts of the body. The action of these other organisms makes many diseases mixed infections, and in the infectious diseases they play an important rôle. In an advanced case of pulmonary tuberculosis, only a part of the lesions which we find are due to the action of the tubercle baccilli. Many of the inflammatory conditions are due to the action of the pyogenic micrococci which find suitable conditions for their growth in the lesions produced by the tubercle bacilli. In diphtheria the death of the individual is frequently due to the action of these extraneous organisms, against whose action the specific treatment of the disease has no influence.

In diphtheria, in almost all cases, the primary lesions are found in the mucous membrane of the mouth, pharynx or larynx. The name of the disease is derived from the character of the primary lesions. There is an intense inflammation of the part affected, and it becomes covered with a membrane. The macroscopic appearance of this membrane is familiar to you all. Its situation and its character varies. It usually appears first over the tonsils, and from here extends over the adjoining mucous membrane, and may invade the soft palate, the base of the tongue, the pharynx and air passages. In the air passages it may extend from the larynx into the trachea, and even into the ramifications of the bronchi. Sometimes the membrane extends in an almost continuous layer over all these parts, sometimes only small isolated patches are seen. Large continuous masses of membrane may be formed by confluence of smaller patches. The color of the membrane, and its connection with under-lying tissues, varies. In a well marked case it has a dirty greyish or brownish color and cannot be easily removed from the surface. When it first appears it is thinner, of a whitish color, and may be removed from the sur-

face. After death its connection with the tissue beneath is less firm, and it may be stripped off in large shreds. The adhesion of the membrane to the tissue beneath varies in different places. In the air passages it is less adherent than in the pharynx, and not infrequently during life large masses of the membrane may become separated and coughed up.

The epiglottis also shows a varying degree of involvement in the process. There may be only small foci scattered over the surface of this, or the entire epiglottis may be converted into a dense hard mass covered and infiltrated with fibrin. When the membrane is forcibly removed during life a raw surface remains. The mucous membrane in the vicinity is deeply injected, and there is swelling and œdema of all the adjacent tissues.

On microscopic examination of the membrane it is found to consist largely of fibrin, in the meshes of which leucocytes and remains of epithelial cells are found. The membrane does not consist of a homogeneous mass, but certain differences in structure may be recognized in it. Usually on the surface there is an indistinct granular mass which contains various sorts of bacteria. Beneath this a more regular meshwork of fibrin appears, and below this again we find the fibrin in large, more or less regular meshes. In this mesh-work the character of the fibrin varies. In some cases the filaments are very fine, in others there are broad hyaline looking masses. The surface beneath the fibrin is uncovered by epithelium. In some cases the epithelium is entirely destroyed, in others, here and there, a few cells still adhering will be found. If the section has been made at the edge of the patch the fibrin may be seen extending over the epithelium.

A marked difference will be found in the relation of the membrane to the surface beneath, in the larynx and trachea as compared with the pharynx. In the trachea especially

the connection of the membrane with the surface is much looser. It will usually be more or less separated from the surface by the necessary manipulation in hardening and cutting the sections, and a space will be found beneath it. The membrane is sharply separated from underlying tissue by the basement membrane of the epithelium. This basement membrane is swollen and hyaline, and more or less necrosis in the tissue immediately beneath it is seen. The blood vessels are dilated, surrounded by numbers of leucocytes, and some of them contain masses of fibrin. The walls of many of the more superficial vessels are hyaline. In the pharynx, and particularly over the tonsils, there is a close connection between the membrane and the subjacent tissue. The dense basement membrane which forms the limit of the membrane in the trachea is not found here. There is some formation of fibrin in the loose interstices of the connective tissue, the filaments of which may be continuous with that on the surface. The membrane extends directly into the depressions and crypts of the tissue and into the mouths of the mucous glands. The tissue changes are similar to those described in the trachea. There is the same congestion of the blood vessels, cellular infiltration, thrombosis and fibrin formation. In the later stages of the disease in both the pharynx and air passages the membrane may become separated by a cellular exudation beneath it. After death it is softer and more easily removed.

The relation of the Klebs-Löffler bacilli to the membrane is interesting. The bacilli are most easily stained by the same method which stains the fibrin. Immediately on the surface of the membrane great numbers of various bacteria will often be seen. These are principally streptococci and other forms of cocci and bacilli. It is probable that these organisms find a suitable place for their development in the membrane, and to their action may be ascribed the break-

ing down of the fibrin reticulum to a granular mass. Among these various organisms the Klebs-Löffler bacilli can be recognized. They occur in definite groups, and can easily be distinguished from the other forms. Immediately below the surface the other organisms become less abundant and the groups of the Klebs-Löffler bacilli more numerous. In the lower portion of the membrane where the fibrin net-work is more dense, all of the bacteria are less numerous and often entirely absent. The subjacent tissue, even when intensely inflamed, rarely shows any organisms.

This description holds for the typical cases of diphtheria, but the most cases seen at autopsies are not typical. In the majority of cases at the autopsy we do not find an extensive and definite membrane extending over the pharynx and uvula. In many cases only here and there small patches of fibrin are seen on the swollen dark red mucous surface. Superficial ulceration and necrosis often mark the place occupied by the membrane during life. In some cases the only membrane seen is on the under surface of the epiglottis. The membrane is often so loose that it may be washed off.

There are various views held as to the formation of the membrane. These views are of importance in diphtheritic processes generally, and do not hold exclusively for diphtheria. The view most generally accepted is that of Weigert, in accordance with which the process consists primarily in a necrosis of the epithelial surface. The exudation from the vessels beneath comes in contact with this necrotic material coagulates and forms fibrin. In support of this view we know that fibrin is always formed when an exudation comes in contact with necrotic tissue. No matter how the necrosis is produced, whether by chemical or mechanical injury, or by the primary action of bacteria, fibrin is always deposited in and around the necrotic

cells. This view of primary necrosis is also held with some modification by Virchow. In his last publication on the subject he defines the diphtheritic process as necrosis of tissue. This does not necessarily lead to the formation of a pseudo-membrane, but when this is formed it is after necrosis has taken place. The epithelium is destroyed and removed, and the fibrinous exudation forms on a surface deprived of epithelium. Another view is that of Wagner, which has been accepted with certain modifications by Recklinghausen, and which is more fully expressed in the work of Smirnow on membranous gastritis. According to the view of Wagner the changes consist in a more or less marked hyperæmia and inflammation of the tissue beneath. The membrane is formed in the place of the epithelial layer and is not an exudation from the vessels beneath. It is due to a fibrinous metamorphosis of the epithelial cells themselves. The cells are directly transformed into fibrin, the appearance of a network being given by vacuoles in the centre of the cells, with fibrinous processes proceeding from them. Wagner figures epithelial cells so metamorphosed that the cell is converted into an irregular vacuolated mass, with long processes proceeding from it, giving to the cell an appearance of branching antlers. Recklinghausen has modified this view of Wagner's in that he makes the formation of the diphtheritic membrane a part of the general process of hyaline degeneration. The epithelial cells undergo a hyaline degeneration, the hyaline material is formed in the cells and exuded from them, forming the reticulum. The process also extends into the tissue beneath, in which there is a similar hyaline degeneration of the walls of the vessels and of the tissues. According to Recklinghausen this hyaline degeneration of the tissues is the primary, and the inflammatory processes are superadded to this.

Oertel, in his great work on diphtheria, believes that the formation of the membrane is due to the coagulation of the

exudation, and that the epithelial cells themselves take no part in it. The most careful of the recent investigations as to the nature of the diphtheritic membrane is that of Heubner. Heubner investigated the membrane during life by stripping off small pieces which were hardened in various ways and examined. He examined in this way portions of the membrane in various stages of the disease, commencing on the second day. He found that in the beginning of the disease the membrane was formed in the most superficial layer of the epithelium, and was due to coagulation between the cells. The epithelial cells themselves were not always necrotic and their nuclei could be recognized. With the extension of the membrane formation the lower layers of the epithelium were gradually implicated in the process, and here also coagulation of the exudation coming from the subjacent vessels could be made out. According to Heubner the K. L. bacilli are not found in the membrane itself before the third day of its appearance. It would seem most probable, from what we have observed of the membrane formation, that all these views are more or less correct. The membrane is formed both by a coaguation of the exudation and by a fibrinous metamorphosis of the cells themselves; not only of the epithelium, but also of the leucocytes which, in the early stages of the process, make their way from the subjacent tissue into the epithelium. We know that under other conditions from the cells themselves, a material can be formed which has the micro-chemical reactions of fibrin.

This membrane formation, as we have said before, is not a property which exclusively belongs to the action of the diphtheria bacilli. The diphtheritic process, an inflammation with the formation of a fibrinous exudation, is one of the most common of pathological processes. We find it on all of the surfaces of the body. It is more commonly seen in the action of certain bacteria than others. Among

the bacteria the pneumococcus is probably more apt to produce a fibrinous exudation than any other. The most typical fibrinous exudation may be produced by chemical irritants; the application of croton oil or of the vapor of amonia to the mucous membrane of the pharynx or trachea will produce a typical fibrinous exudation.

The writer once saw a case in which an extensive membrane, extending into the larynx and trachea, was produced by the accidental application of croton oil. A man was brought into the hospital unconscious, in a condition of uræmic coma. A few drops of croton oil were applied to the back part of his tongue. The patient accidentally made an inhalation at the same time, and the croton oil was aspirated into the air passages. After death the entire surface of the trachea and larynx extending down into the finer bronchi was covered with a dense membrane which could not be distinguished from the membrane of a marked case of diphtheria.

A great deal of interest has come from the study of the cases of diphtheria at the autopsies at the City Hospital. It is known with regard to many bacteria, while their action is exerted more particularly at certain places, this being due to external conditions favoring their entry into the organism at certain places, and to the fact that in these places they find more suitable conditions for their existence, they may be found also in other uncommon situations. This is notably the case with the pneumococcus. There are few pathological conditions found in any part of the body which may not be associated with this organism. While the diphtheria bacilli are always found associated with the typical disease having its local manifestations in the pharynx or air passages, they are more rarely met with in other parts of the body and associated with other processes.

It is our habit to make bacterial cultures at all autopsies

from all of the principal organs of the body. In one case of acute endocarditis typical K. L. bacilli were found in the heart valves. These bacilli, morphologically, and in all of their cultured relations, were identical with the ordinary bacilli, but were devoid of virulence. They were associated with pneumococci, and the lesions were probably due to these. A similar case has been reported by Howard. His case was also one of endocarditis. The bacilli were found in the vegetations on the cardiac valves and in all of the organs. They were identical with the K. L. bacilli with the exception of being non-virulent. In another case they were obtained from the lungs in a case of disseminated tuberculosis. There was a tuberculous ulcer of the trachea from which no cultures were made, nor were any made from the pharynx. In the culture from the lungs numerous colonies of diphtheria bacilli and streptococci developed in addition to a few colonies of staphylococcus aureus and other organisms. Streptococci were also found in the spleen. The bacilli killed a guinea pig in thirty-six hours with the lesions of experimental diphtheria. From another case of a lung in a state of grey hepitization, the culture made from a consolidated area of the lung gave a few colonies of the K. L. bacilli along with other organisms. A guinea pig inoculated died at the end of three weeks. In a fourth case, one of extensive phthisis, the autopsy made at one of the insane asylums, a few colonies of K. L. bacilli developed from the lungs. Unfortunately in but one of these four cases were the throat organs examined. The circumstances of the autopsy forbade the examination of the throat, but there was nothing clinically which directed attention to the throat. In the one case in which the throat was examined a typical tuberculous ulcer was found, from which, however, no cultures were made.

These cases are interesting, and it is difficult to fully explain them. The general result of cultures at autopsies

shows that in most diseases there is a poly-infection when death takes place. Not only are the specific organisms of the disease found, but there are other organisms whose presence is more or less accidental and which have had little to do with the production of the lesions. They are usually the more common organisms which find opportunity for entering the tissues in the reduced resistance preceding death. It is probable that these four cases should be so regarded. Other organisms were present, and the lesions were not of such a character as to lead us to believe that the diphtheria bacilli had any part in their production. These cases are to be distinguished from true mixed infections in which distinct lesions due to the action of various organisms have been found. In the cases investigated at the City Hospital such mixed infections have been seen in typhoid fever, scarlet fever and measles; the lesions in these diseases being accompanied by throat lesions due to the diphtheria bacilli.

Diphtheria bacilli may be found at other places on the surface of the body. The intact epidermis of the surface of the body probably is an efficient protection against their action, but superficial abrasions or ulcers on persons with diphtheria are apt to become infected. The bacilli have been found, in an anal fistula, in an ulcer on the arm, in excoriations on the face, and in a number of other places on the surface. The mode of infection is by the hands which may be assumed to be always infected from contact with the secretions of the mouth and nose containing the bacilli. Wright calls attention to the slight degree of virulence of the bacilli which are found in these places. In twelve cases in which the virulence was tested the bacilli from three had no effect on guinea pigs, and in three other cases the inoculated animals lived more than a week. Wright states that a mild degree of virulence or none at all has been found in 50 per cent. of the organisms obtained from these places.

In some of the infectious diseases the organisms causing the disease are only found in connection with the primary lesions. In others there may be a general invasion of the blood and tissues with the organisms. In the early investigations on diphtheria the bacilli were only found in the primary lesions, and it was supposed that no general invasion of the body took place. More recently, Frosch and others have found the bacilli in the internal organs by the usual methods of culture. They are present in such small numbers that they are only found by using large quantities of the substance of the organs for the cultures. Wright's statistics of cultures show that they are most frequently found in the lungs, and more rarely in other organs; but they may be found in any of the internal organs. It is natural that they should be more often present in the lungs, from the close connection of these with the larynx and pharynx. The bacilli are present in these internal organs in such small numbers that they cannot be found on microscopical examination of the tissue, nor can they be shown to have any relation with the lesions in the organs. So far as we know at present the diphtheria bacilli are only capable of producing typical lesions on epithelial surfaces. It is to be expected that a few in the course of the disease may get into the blood or lymphatic circulation, and thus be deposited in the internal organs. When directly injected into the subcutaneous tissue of rabbits they induce extensive necrosis of tissue and inflammation.

We come now to the second class of lesions found in diphtheria, those produced not by the direct action of the bacilli on the tissues, but by the action of soluble chemical substances which are produced by the bacilli in the primary foci, and absorbed from there and carried to the tissues everywhere. Some of the lesions so produced are evident on macroscopic examination, others are only found on microscopic examination. Oertel, in his classical monograph on

the disease, was the first to call attention to these lesions. Welch and Flexner have called attention to similar lesions in experimental diphtheria, and have shown that they may be produced by injecting into animals the soluble toxines derived from cultures of the bacilli. The most obvious of these lesions are found in the lymph glands of the body, and consist in hyperplasia of the lymphatic tissue. The lymph glands of the neck into which the lymphatics from the throat enter are the most affected, but all the lymphatic tissue, including the follicles of the spleen, take part in it. In the intestinal canal both the solitary follicles and the Peyer's patches are greatly enlarged, and the latter may present the appearance of the early stage of typhoid fever. The swollen glands are red and soft.

The spleen is somewhat enlarged, this being due to hyperplasia of the follicles and of the pulp. It is never so soft as in some of the other infectious diseases. The liver rarely shows much change to the naked eye. It is somewhat paler than normal, and occasionally small opaque spots may be seen in it. The kidneys are rarely affected. In forty-one autopsies on diphtheria, in but one case an acute interstitial nephritis was found. Diphtheria has not the same tendency to produce nephritis as have the other infectious diseases of children. Slight degenerative changes are found on microscopic examination sufficient to explain the albuminuria commonly present. In two of our cases ecchymoses were found in the mucous membrane of the stomach, and the bacilli obtained from them on culture.

On microscopic examination lesions consisting in small areas of necrosis, with nuclear fragmentation, may be found in all the organs. They are more common and more marked in the lymph glands than elsewhere. Oertel was the first to call attention to them. From our experience it would seem that they are more common in the experimental diphtheria produced in animals by inoculation than in man.

These foci are not produced by the action of the bacilli. On microscopic examination no organisms are found in connection with them, and they may be produced by the soluble toxines obtained from cultures. They are of the same general character as the small necrotic foci found in the liver in typhoid fever, and which are produced not by the bacilli but by toxic substances absorbed from the alimentary canal.

We come now to the consideration of the third class of lesions, those due not to the action of the specific bacteria and their soluble products, but to other organisms which find favorable conditions in the primary lesions produced by the diphtheria bacilli. There is little doubt that in most cases, particularly in the later stages, there is a mixed infection in the primary lesions of the disease. It is very seldom that a pure culture of the diphtheria bacilli can be obtained from the throat. The most common pathogenic organism found with it is the streptococcus pyogenes, one of the pyogenic organisms. We do not know what part this organism plays in the primary process. It is quite capable of itself of producing a diphtheritic inflammation, which cannot be distinguished from that produced by the diphtheria bacilli. It is possible that it assists in the production of the membrane, or it may in some way favor infection with the bacilli. These other organisms act in two ways. They may be taken up from the throat by the blood and lymphatic vessels, enter into the circulation and produce a general septicæmia, or they may pass from the primary foci into the lungs. Wright has found in twenty-six out of forty-one autopsies a more or less general invasion of the blood and tissues with the pyogenic organisms, among which the streptococcus was the most common.

Broncho-pneumonia is one of the most common conditions met with in the infectious diseases of children. It has been present in greater or less degree in twenty-four

of the forty-one autopsies. Its cause must be attributed to the action of the streptococci. It is true that the diphtheria bacilli are found in the lungs in nearly all autopsies on diphtheria, and they may produce a typical membrane in the fine bronchi. On microscopic examination of the tissue they are not found in the alveoli in connection with the lesions, and from what we know of the pathogenesis of the bacilli it is not probable that they could produce such lesions. The streptococci or pneumococci in these cases are found in cultures made from the lungs and, on microscopic examination, in connection with the lesions. Moreover, similar lesions are found in scarlet fever and in measles. In many of the autopsies these pulmonary lesions are so extensive that death may be directly attributed to them. It would not be possible in the limits of this paper to consider the very interesting questions of the comparative virulence of the diphtheria bacilli and the characters pathological and clinical of those cases of angina which resemble diphtheria and are not produced by the diphtheria bacilli. Such cases are not infrequently met with. On the other hand it should be remembered that inflammation produced by the diphtheria bacilli does not always lead to the formation of a pseudo membrane. Cases have frequently been seen in which a simple angina has been associated with the bacilli. From the anatomical and experimental study of diphtheria we may regard as certainly established : —

That there is a definite infectious contagious disease produced by the diphtheria bacilli.

Other organisms may produce lesions in the throat which are similar to the primary lesions of diphtheria.

The primary lesions of the disease are due to the action of the diphtheria bacilli. They are always found associated with these lesions, and are chiefly found on the surface or in the upper layers of the membrane.

There may be a more or less general invasion of the tis-

sues by the bacilli. They are found in the internal organs in small numbers, and do not appear to have any relation to the lesions.

Lesions are produced in the internal organs by the action of soluble toxic substances which are produced by the bacilli in the primary lesions and absorbed. Similar lesions can be produced in animals experimentally by the injection of the germ free filtrates of cultures.

Cultures made at the autopsies have shown that in most of the fatal cases there is a general invasion of the tissues by some of the pyogenic organisms, of which the streptococcus is the most common.

Infection with other organisms plays a considerable rôle in the pathology of the disease, and some of the most important lesions, as the broncho-pneumonia, are due to these other organisms.

There is not the same tendency to renal affections in diphtheria as in scarlet fever and other infectious diseases of children.

Abrasions of the skin in patients with diphtheria are apt to become infected with the bacilli.

THE PREPARATION OF DIPHTHERIA ANTITOXINE.

BY JOSEPH L. GOODALE, M.D., BOSTON.

THE general principles involved in the preparation of diphtheria antitoxine have recently become familiar to all medical men. Their recapitulation does not therefore seem essential for the purposes of the present paper, which are, first, to note the events of interest occurring during the prosecution of some recent work on the subject; and second, to direct attention to certain points of difficulty which have been encountered.

In view of the limited time at my disposal it appears preferable to omit detailed reference to the preparation of culture media and to the selection of special bacteriological apparatus. It will be sufficient to state that full accounts of the former are to be found in numerous recent works, while complete catalogues devoted solely to this subject have been issued by several manufacturers of scientific supplies.

The acquisition of a culture of diphtheria that will yield the requisite amount of toxine under specified conditions is a matter of the first importance. One culture may be a hundred times as productive of toxine as another, although both are grown under the same conditions. My own experience indicates that a satisfactory culture is something of a rarity. Cultures were tested from eight cases of severe clinical diphtheria in the following way: From each case a flask of bouillon was inoculated, and the virulence of the

fresh twenty-four hour culture tested by injecting into a guinea pig one cubic centimeter. From the two pigs which died first within two days, pure cultures of the diphtheria bacillus were again recovered, inoculated into bouillon, and grown under proper conditions for three weeks. At the end of that time the bouillon of one flask was found to be nearly twice as rich in toxine as the other, and this culture was used exclusively in the subsequent work. The virulence of this bacillus and its toxic productiveness have remained unimpaired after more than a hundred re-inoculations, covering a period of eight months.

When a flask of bouillon is inoculated with the diphtheria bacillus the following phenomena occur: At the end of a day or two the bouillon is generally turbid throughout, but with little or no sediment. Although the bacilli are now at the stage of maximum virulence, yet no appreciable amount of toxine is to be found, as may be shown by filtering off the bacilli, and injecting the clear filtrate into guinea pigs. Large doses of this produce often no more effect than an equal amount of ordinary bouillon. At the end of a week a distinct sediment settles, and a thin translucent layer of bacilli can be seen floating on the surface of the liquid. Microscopical examination shows what is taking place: The sediment consists of dead bacilli, disintegrated, and no longer identifiable, while the surface layer is composed of living, rapidly multiplying bacteria of characteristic appearance. Toxine can now be demonstrated in the fluid.

During the next few weeks the sediment increases, often forming more or less coherent flakes and lumps, the superficial layer becomes thicker, and more opaque, and is composed of scaly particles. If these be once separated by shaking they show no tendency to coalesce, but remain discrete while the intervening surface becomes covered with a film, slowly and progressively increasing in opacity. After

five or six weeks the surface layer often sinks and disappears; examination shows very few living bacilli, but the fluid is rich in toxine.

It has been stated that toxine is not secreted by the living bacilli, but is the product of their disintegration after death. Whether this be so or not, the amount of toxine in a given bouillon culture is proportionate to the amount of sediment, that is, to the number of bacilli which have completed their cycle in the liquid. Multiplication of the bacilli is favored by access of oxygen, and it has been consequently recommended to grow the bouillon cultures in a current of air. It is unquestionably true that a bouillon culture three inches deep yields proportionately less toxine at the end of a month than one one inch in depth, there being in the latter instance a proportionately greater air surface. While oxygen is thus shown to be required, probably but a small amount is made use of, and I have not found that bouillon cultures one-half inch deep, grown in a current of moist air, yield more toxine than when grown in the ordinary cotton plugged flask. Provided the layer of fluid be shallow the interchange of air through the cotton plug is probably sufficient for the needs of the bacteria. The risk of contamination is always greater even with the strictest precautions where there is a current of air entering the flasks: and, provided there is sufficient incubator space, the ordinary method seems to me preferable.

The toxic strength of each lot of toxic bouillon is to be carefully determined. If of standard strength, one-tenth of a cubic centimeter should prove fatal to a guinea pig in about thirty-six hours. The amount of toxic bouillon constituting the minimum fatal dose for a guinea pig under these circumstances is a toxine unit. Since in the course of this work the toxic strength of the bouillon employed has not been constant, it seems preferable to designate the doses injected into the horses, as toxine units, rather than so

many cubic centimeters of toxine. Thus at the outset one cubic centimeter of the bouillon contained five toxine units, and was consequently of half the standard strength, while later the standard strength of ten toxine units to the cubic centimeter was obtained.

For the filtration of the toxine from its detritus and still living bacilli, the Pasteur filter was used.*

The filtrate thus obtained from the bouillon is absolutely clear and sterile, but is, however, an excellent culture medium for bacteria that may find entrance. I have used as a preservative a ten per cent. solution of thymol in chloroform, which, added to the toxine in the proportion of one per cent., has efficiently checked the development of foreign germs.

With reference to choosing horses for the purpose of immunization, my experience is too limited to justify the formulation of definite rules. It is impossible to tell at the outset what horses will stand the process sufficiently well

* A large stout glass cylinder is constricted abruptly at one end to a diameter of an inch, and this drawn out to a tapering extremity. A Pasteur filter is fitted by a rubber stopper to the constriction within the cylinder, and the tapering end of this adjusted to a filtering flask. When now the cylinder is filled with liquid, and suction applied to the filtering flask, atmospheric pressure forces the liquid through the porous porcelain, and the filtrate falls drop by drop into the filtering flask. As the level of the liquid in the cylinder falls below the top of the bougie, less and less filtering surface is at work. To obviate this disadvantage a large test tube of such a diameter as to fit easily over the bougie is filled with the liquid, and by a sudden movement inverted over the bougie, its lower end resting upon the projecting shoulder of the bougie. The bougie is thus surrounded by a column of fluid which is sustained by atmospheric pressure.

The remainder of the fluid is now poured into the cylinder and air exhausted from the filtering flask. Filtration now proceeds with the whole of the filter actively at work, until the last few cubic centimeters of liquid in the cylinder are reached and the level sinks to the bottom of the test tube. Bubbles of air are then drawn into the test tube, the column in it falls, and the filtration is complete. The apparatus admits of ready sterilization in separate pieces, and is exceedingly easy to manipulate. The filtering flask may be connected by a Y fork with a glass tube inserted into a bottle of mercury, thus enabling one to judge, by the height of the column of mercury in the tube, of the amount of vacuum obtained. I have found an air pump more satisfactory than the water aspirator. By interposing a large stout bottle between the air pump and the filtering flask a single exhaust will produce a vacuum sufficient to filter a liter of toxine.

to be brought to a high degree of immunity, and what, on the other hand, will prove of only moderate value. A horse somewhat thin, with soft muscles, is easier to manage than a stout one, since the injections are more readily made, and the jugular vein easier of access. A horse of a vicious or nervous disposition is neither agreeable nor safe for the operator. The mallein test should be made before beginning treatment.

The process of immunizing the horses requires good judgment and extreme care. As to their feeding, it seems to me that until they have been bled they should not be treated very differently from any horse leading an inactive life. After each tapping a generous diet should be allowed. The weights and general condition are to be most carefully watched, and on any falling off the injections are to be suspended. As will be shown later this is a point of extreme importance.

For the injection of large amounts of toxine into the horses a syringe was used holding 100 c.c. The interposition of a short bit of rubber tubing between the needle and the syringe was found necessary to allow for sudden movements of the animal during the process. The short stout tuberculin needle of the veterinarians causes practically no pain on being introduced, if the animal's attention be distracted by the application of an implement known as a "twitch" held on the nose or ear by the assistant. The loose skin just back or in front of the foreshoulder are most suitable places for injection. It is also easy to introduce the toxine intravenously by compressing the external jugular vein, and thrusting the needle into the distended vessel.

The immunization of five horses for the Massachusetts State Board of Health was begun in the second week of December, 1894. During the first month of the inoculations the animals exhibited essentially similar and uneventful clinical histories. The initial dose of one half the nor-

mal toxine unit was gradually increased every other day until at the end of four weeks fifteen units were injected. Up to this time no reaction of any sort was apparent. This gradual commencement seems justified by clinical and experimental analogy. The sudden introduction of diphtheria poison into the organism of an animal totally unused to such toxic shocks may be productive of tissue changes apparent only after the lapse of considerable time. I have repeatedly observed that a minute dose of toxine in a guinea pig, scarcely sufficient to cause malaise, has been followed after two or three weeks by paralysis of the extremities, cachexia, and progressive emaciation. On these theoretical grounds, therefore, the attempt was made to avoid any marked reaction at the outset.

After the first month the animals began to show widely differing degrees of susceptibility. The clinical histories of two horses will illustrate respectively the extremes of tolerance and of sensitiveness.

A small mare of good appearance, with soft muscles, received fifteen toxine units at the end of the first month with absolutely no reaction. The doses were then rapidly increased twice a week till at the end of seven weeks she was receiving 500 units, at nine weeks 1500 units, with slight local reaction, and a week later a dose of 2500 units, with but slight local, and no constitutional symptoms. On March 5 a preliminary tapping was made, and the serum was found to possess an immunizing value of at least 1–50,000.

During the next two weeks 5,000 toxine units were introduced without ill effect, and on March 23 six liters of blood were withdrawn. The value of this serum was found to be not under 1–75,000. This strength had therefore been attained in a little over three months from the beginning of the inoculations.

In contrast with this rapid immunization, another horse

equally sound, but more irritable and difficult to handle, began to experience at the end of the first month after each dose of 15 units, local swelling lasting several days. At six weeks 100 units were followed by considerable swelling lasting a week. At the end of two months 500 units were followed by enormous swelling of the foreshoulder, with general œdema of the whole extremity. In a week this had gone, and a repetition of the dose was followed by much less reaction. During the third month injections of 1000 units were followed by very hard indurations about eight inches in diameter, each requiring for subsidence about ten days. The injection of 3000 units at the end of four and a half months was followed by enormous reaction, a rock-like induration eighteen inches across, with sharply defined edges, showing no tendency to central softening or suppuration, disappearing after three weeks irregularly, leaving several discrete masses which finally vanished. Then 4000 units excited but moderate reaction, which disappeared in a week.

The horse was tapped at the end of five months and a half, and showed a serum of the strength of 1–75,000.

Between these two extremes the intermediate spaces could be filled in by the histories of the other animals. A detailed account would involve much repetition, and it seems preferable to state in the form of a summary the phenomena which have been observed.

In the first instance the local reaction appears to stand in direct relation to the susceptibility of the animal at the moment of injection. In a sensitive animal an injection of toxine is followed by a pronounced reaction lasting from a few hours to several weeks. If the injection is made into the subcutaneous tissue the tumefaction is soft and of the nature of an œdema, while if made into the muscle it is firm, at times of rocky hardness. This swelling may remain small, being not more than two or three inches in diameter,

or it may increase in size, attaining a diameter of two feet or more, extending beyond the shoulder and even travelling along the trunk as a well-defined œdematous area. A reaction of this extent is generally sufficient cause for grave anxiety. These extensive reactions are especially apt to occur after an animal has been bled and his powers of resistance consequently diminished. It is common for a horse which has shown no especial sensitiveness during the process of immunizing to manifest, after tapping, a marked reaction from the injection of one half or one quarter of the amount previously given without ill effect. Furthermore a horse which has begun to lose weight may, if the injections are continued, unexpectedly develop one of these pronounced and serious disturbances. These local reactions may be complicated by the entrance of foreign bacteria. Abscesses have occasionally formed and healed after evacuation without untoward incident. A more serious event occurred in a horse which had been immunized rapidly and easily. After the second tapping an injection of 2500 toxine units was followed by enormous firm swelling of the foreshoulder œdema of the extremity and neighboring portion of the trunk, death supervening in four days without characteristic symptoms. Incision into the tumefaction at the shoulder showed at the depth of an inch below the skin a collection of reddish serous fluid and large quantities of foul smelling gas. Undoubtedly some foreign organism had gained entrance and found a suitable field for development in the exudation consequent upon the injection, but from lack of facilities for anærobic cultivation its nature was not determined.

Constitutional disturbances have been much less pronounced than might be expected. Even with the most severe local reactions no general symptoms could be perceived beyond a loss of appetite and spirits. In one instance, however, the intravenous injection of toxine was followed by pronounced effect. A horse that received without ill effect

3000 units subcutaneously, exhibited on the introduction of an equal amount into the jugular vein, in the course of half an hour, sweating, trembling, faintness, and loss of appetite. The symptoms passed off in a few hours, and the horse appeared as usual by the following morning.

This procedure appeared to be attended with some risk and was not repeated.

The process of tapping is comparatively simple, and may be completed in fifteen minutes. One or two assistants, skilful in the management of horses, are needed. The animal submits most readily to the operation if not confronted with elaborate preparations for securing him. He is backed into a short narrow stall, so arranged that his neck protrudes from it, and he is unable to move sideways or backwards. The head is firmly held, a rope is passed around the neck low down and a wedge thrust beneath the rope so as to compress the external jugular vein, which is immediately seen to stand out for several inches below the angle of the jaw. A syringe full of two per cent. cocaine is injected over the vessel where it appears most superficial, and a short incision made, exposing it. It is generally recommended to thrust a trocar into the vein and conduct the blood into a jar through a rubber tube. I have found it more simple and expeditious to incise the vein directly; the blood then spurts in a steady stream for several feet. The receiving jar is placed close to the incision, and the blood allowed to flow into it without splashing, which is apt to alarm the horse. When four to eight liters are collected, the tourniquet is withdrawn, and the flowing generally ceases. To insure safety a pin is thrust through the skin flaps, which are then brought together by a thread in figure of 8 loops. The horse is not allowed his head for a day, but is fed from a rack to avoid the danger of hemorrhage.

The amount of serum that separates is dependent upon the completeness of the contraction of the fibrin in the clot.

If the clot adheres to the sides of the jar, contraction of the fibrin is prevented, and at the end of several days the clot is still firm, and but a few drops of serum have separated. If, however, the clot is separated from the sides of the jar, contraction immediately begins with a simultaneous forcing out of serum.

The one factor that more than any other promotes contraction of the clot, is the presence of a large surface in proportion to the volume of blood. Thus a jar, half filled, yields proportionately more serum than one entirely filled. The same point is shown by the fact that a partially filled jar, in which the blood has coagulated at a sharp incline, yields more serum than the same amount of blood coagulated in an upright jar.

After many experiments the following method was found to yield the most satisfactory results. Cylindrical jars of one liter capacity are used, and vaseline is thoroughly applied to the interior to prevent adhesion of the clot to the sides. A large test tube filled with cracked ice, closed at the top by a perforated rubber stopper, is placed in each jar before receiving the blood. When filled the jar is placed on ice, and the blood slowly coagulates, becoming a firm mass in the course of several hours. The test tube is then withdrawn from each jar, leaving a cylindrical deficiency in the clot. At the end of twenty-four hours the result is striking. The clot has shrunken to a soft, flabby mass, and is surrounded by abundance of clear yellow serum. This is removed by carefully pouring off, and constitutes about two-thirds of the total amount obtainable. If the jars are placed on the ice another twenty-four hours, about one-third more may be obtained. This remainder is colored by solution of pigment in varying degrees, but is equal in all therapeutic qualities to the first yellow serum. The strength is ascertained by either the French or German method. The former was adopted at the beginning of the work, but

I have recently come to regard the latter as more scientific and accurate.

The serum is next passed through a Pasteur filter to ensure sterility, and the filtrate shaken with the chloroform-thymol solution previously mentioned. It is, however, not allowed to stand long in contact with an excess of the solution, since a precipitate readily forms, but is immediately transferred to sterilized bottles, and aseptically sealed, being then ready for use.

THE CLINICAL USE OF DIPHTHERIA ANTITOXINE.

BY WILLIAM HALLOCK PARK, M.D., OF NEW YORK CITY.

Diphtheria is one of the most difficult of diseases in which to judge the effect of treatment, for the different cases vary so enormously in the amount and in the location of their lesions. Most important factors, such as the virulence of the diphtheria bacilli, the extent to which other bacteria are associated with them, and the local and general susceptibility of the patient, are as a rule largely unknown to us.

Before considering the results of the use of antitoxine, it will be well to touch briefly upon certain points in the course of diphtheria without antitoxine. Cases of diphtheria in which the pseudo-membrane is moderate in amount, and remains confined to the tonsils or adjacent parts after twenty-four to forty-eight hours, usually do well under any form of treatment, and are very rarely fatal if no complicating diseases exist. Cases, however, in which the pharynx and nose are also implicated, or in which pseudo-membrane is present in or below the larynx, are very dangerous. If the latter do not die from the immediate toxic poisoning, they are apt to develop later a bronchopneumonia or a septic bronchitis. These are the cases which furnish more than half the deaths at the present time. There is also a variety of diphtheria which we recognize as septic. The diagnosis here must often be made more from the general condition of the patient than

from any local signs. An important fact to bear in mind is that before the use of antitoxine, in a certain number of the cases, the exudate or pseudo-membrane would continue to increase in spite of any treatment. This experience was chiefly met with in the cases seen very early in the disease. For instance, in November, at the hospital three such cases occurred. M. R., three and a half years, was admitted, when but one day sick, with a slight patch on the left tonsil. Temperature was 100; pulse 100. The membrane steadily increased until the child's death. K. M., two and a half years, sick forty-eight hours, admitted with almost no symptoms. On the fourth day she developed laryngeal symptoms with high temperature, and died in three days. J. E., two and a half years, five days sick, tiny patches on tonsils and croupy cough. On the thirteenth day he developed laryngeal stenosis, was intubated, and died in forty-eight hours.

COMPLICATIONS MET WITH IN DIPHTHERIA BEFORE THE SERUM TREATMENT WAS USED.

A few illustrations selected from cases admitted to the hospital in the months just before the antitoxine period.

Child three years old, sick six days; membrane on tonsils, pharynx and in nostrils. On the third day of treatment complete suppression of urine; pulse dropped to 60. Death twenty-four hours later.

Child, age two years, four days sick; tiny patch on tonsils; pulse and temperature nearly normal. Developed pneumonia and suppurative otitis media on seventeenth day of disease; death twenty-first day.

Child, age eleven months; a little membrane on tonsils; temperature 100; pulse 120. Within twenty-four hours temperature rose to 105. Child seized with convulsions and died within twelve hours.

Child six years old, but moderately sick. On fifteenth

day tenderness of all joints. From time to time had general convulsions. These conditions continued until death took place on the twenty-eighth day.

A remembrance of these histories will aid us in estimating properly certain symptoms met with in cases under the antitoxine treatment.

THE ANTITOXINE SERUM.

The serum should have been kept in a moderately cool place; should be clear, and free from any bacterial growth. Now that the supply is abundant, only serum strong in antitoxine should be used. The serum used in these cases was prepared in the laboratories of the New York City Health Department.

METHODS OF INJECTING THE SERUM.

A large hyperdermic injection syringe is selected, holding 10 c.c. It should have a strong, rather long, but not too thick needle. The usual methods of keeping a hyperdermic needle aseptic, and cleansing the skin, suffice. The injection should be made in subcutaneous cellular tissue, not in the muscles, and may be made on the side of the chest, over the pectorals, or in the buttocks, as desired. As a rule no after-pain is felt, but at times the spot is very tender for some days.

In a very few cases abscesses may develop. Proper serum and care in injecting should eliminate this danger.

DOSE.

The size of the dose, I believe, should be measured, chiefly by the extent and intensity of the disease; also, but to a less degree, by the size of the patient and the duration of the illness. For young children with but moderate lesions of tonsils or palate a single dose of 800 units, 8 c.c. Behring's standard No. II. solution, will suffice, or

15 c.c. of a 1 to 50,000 solution Roux. For older children and adults 1,000 units should be given. In children who are already seriously ill or who already show the toxic effects, or in whom the larynx is involved, a dose of 1,500 to 2,000 units, 10-14 c.c. No. III. is necessary.

If the symptoms do not abate, another 1,000 to 1,500 units may be given on the following day. In a few cases still a third injection is required. In a very few, a week or ten days after administering the antitoxine, a slight return of exudate may appear; here another moderate injection is indicated. Where these doses have not benefited, it is doubtful if larger ones will succeed.

TREATMENT OTHER THAN ANTITOXINE.

Since antitoxine is believed to act merely in hastening nature's process of recovery, and since it is certainly not sufficient to save all cases, it seems only reasonable that we should employ with antitoxine all other means, such as stimulants, inhalations and cleansing douches, which we have reason to believe have decided beneficial effects. The local treatment especially is indicated, as the serum has no direct effect on the life of the bacillus.

THE EFFECT OBSERVED IN CASES OF DIPHTHERIA TREATED WITH ANTITOXINE AT THE WILLARD PARKER HOSPITAL DURING THE FIRST FIVE MONTHS OF 1895.

With the exception of a few who died shortly after admission, I have personally watched the results of the treatment in all the cases. For the complete histories I am greatly indebted to the kindness of the Resident Physician, Dr. Somerset, and the Assistant Resident Physician, Dr. Bryant.

STATISTICAL SUMMARY OF RESULTS WITH SERUM.

The cases here considered entered the hospital for treatment between the first of January and the first of May,

1895. They include all patients received who had both clinical and bacteriological evidences of diphtheria. About five per cent. had, upon admission, only swelling and hyperæmia. A certain number were received in a moribund condition; these are also included. Patients who after admission developed some other contagious disease are also included, although they may have died after being transferred to another hospital. From January 1 to May 1 there were 255 cases admitted; of these 183 recoveréd, 71 died, and one still remains in the hospital, making a mortality of 27.8 per cent., or, if the case remaining in hospital should die, a mortality of 28.2 per cent. For the same months of the previous year there were admitted under similar conditions 211 cases, with 82 deaths, or a mortality of 38.8 per cent.

So far as I can judge from memory and from the hospital records, the cases were fully as severe as last year. The number having laryngeal diphtheria indeed was one third greater, and these are the cases which contribute the majority of the deaths. The drop of over 25 per cent. in the mortality I believe to be due to the influence of antitoxine.

I feel compelled here and later to touch upon certain remarks made by Dr. Winters at a meeting of the New York Academy of Medicine, held April 4, and published by him in pamphlet form. From his position as a visiting physician to the diphtheria hospital, and from the fact that he had studied from day to day the effects of the antitoxine treatment, his statements that the treatment had produced not only no good effects but many most dangerous ones, has had a great influence in deterring people from the use of antitoxine, not only in New York but throughout America where his statements have been quoted.

Dr. Winters, in opening his remarks, in order to break the force of a moderate improvement in the mortality of the cases admitted during the first three months of this year,

as contrasted with the same months of last year, declared that diphtheria was far milder now than one year ago, and that this was shown clearly by the fact that in last December there were in the hospital eight successive recoveries after intubation, something never equalled since with antitoxine treatment. The hospital records, when consulted, do not bear out these statements. They show a mortality o 42 per cent. for all cases in December, and that not one of all the thirteen cases intubated recovered. Diphtheria, as met with in the hospital before the commencement of antitoxine, was, therefore, of a severe and not a mild type.

If we consider the cases according to the day of the disease on which treatment was commenced, we find that of the 59 non-laryngeal cases in which treatment was begun within the first three days, but four died—a mortality of six and one-half per cent. One of these was septic from the start; in another the diphtheria was complicated, with general tuberculosis.

Day on which treatment was begun.	1	2	3	4	5	6	7	8 and 9
Pharyngeal and Tonsillar.	4	28	27	36	24	15	7	13
Died	0	2	2	7	4	5	2	4

The mortality in the 95 admitted after the third day was 22 per cent. In laryngeal diphtheria the mortality, as is seen in the table, was lower in the cases admitted within the first three days, but after that time no difference was observed.

Day on which treatment was begun.	1	2	3	4	5	6	7	8
Laryngeal Diphtheria. (Cases in brackets were intubated.)	0	6 [3]	21 [14]	20 [15]	14 [7]	9 [8]	4 [4]	10 [7]
Died		[2]	11 [9]	13 [11]	7 [6]	6 [6]	4 [4]	[4]

The results noted by the New York City Health Department Inspectors in the cases injected by them throughout the city are very similar.

There is one consideration which I think is rather over-

looked in estimating the mortality in those in whom the treatment is begun late. These must, from the nature of the case, have had severe diphtheria, otherwise they would not have remained sick so long, nor have sought treatment. The mortality would always be somewhat above the average in these cases, regardless of the influence of treatment.

Further, we have to remember that the facts obtained from the class of persons bringing their children to the hospital are not always accurate.

The effect of antitoxine in the treatment of laryngeal diphtheria is a matter of great interest. During the last five months of 1894, that is before the use of antitoxine, there were 36 intubated. Of these 23 died within four days. In 1895, during February, March and April, the months during which antitoxine of good strength was used, there were 53 intubated, with only 17 deaths, within the first four days. Among the 13 cases receiving no antitoxine, which lived more than four days, there were nine deaths after the fifth day, and of 36 receiving antitoxine, 17. Without antitoxine four recovered out of 36; with antitoxine, 19 out of 53.

Laryngeal cases which did not require intubation for the same months gave in 13 without antitoxine four deaths, and in 18 with antitoxine four deaths.

The element of chance in these results apparently so favorable to antitoxine must be considered; yet if the improvement continues it will be but fair to attribute it to antitoxine.

The following tables give the cases of laryngeal diphtheria in consecutive order, showing the cases ending fatally and the day of death. Those marked with a star were intubation cases. Those having extensive pneumonia are also indicated.

Died During						Recovered.	Month.
0–2 Days.	2–4 Days.	4–7 Days.	1–2 wks.	2–3 wks.	Over 3 wks.		
1* pneum. 4* 5* 37* 6*	2* pneum.	3* 38				40	August.
	7* 39					8* 41 42	September.
9* 10* 11* 12* 13* 15* 17* 18*			16* 43			14* 44	October.
19*	22* 23*		26*	20*	21 pneum.	24* 45 25*	November.
28* 30* 31* 36* bron.	27*	32* 39	33*		29* pneum. 35 pneum.	46 47 48 49	December.
Int. 18	Int. 5 / Not int. 1	Int. 2 / Not int. 2	Int. 3 / Not int. 1	Int. 1	Int. 3	Int. 4 / Not int. 9	

Laryngeal diphtheria, intubated, 36.—Recovered, 4; died, 32.

Laryngeal diphtheria, not intubated, 13.—Recovered, 9; died, 4.

LARYNGEAL DIPHTHERIA WITH ANTITOXINE.

Deaths During						Recovered.	Month.
0–2 Days.	2–4 Days.	4–7 Days.	1–2 wks.	2–3 wks.	Over 3 wks.		
3* 4* moribund. 22*	12*	1* scarlet f. 11* pneum. 16* pneum.	15* pneum.	6 marasmus. 8* scarlet f. 9* 18* pneum.	2 pneum. 10 14* paralysis.	5 7* 13* 17 19 21*	February.
25* 29* 32*	30* pneum. 32* pneum. 33* 40 pneum.	35* septis	23* pneum. 26*	24*	28* pneum. 30* pneum.	27 31* 34* 36 37 38* 39* 41 42* 43*	March.
46* pneum. 49* pneum. 50* moribund. pneumonia. 51* sept. bron. 52* pneum. 53* pneum.	54* pneum.			68* pneum.	63* paralysis. pneum. 69 pneum.	44* 47 45* 48 55* 56 57* 59 58* 60 61– 62* 64* 65* 66* 67*	April.
Int. 12	Int. 5 / Not int. 1	Int. 4	Int. 3	Int. 5 / Not int. 1	Int. 5 / Not int. 2	Int. 19 / Not int. 13	

Laryngeal diphtheria, intubated, 53.—Recovered, 19; died, 34. Laryngeal diphtheria, not intubated, 17.—Recovered, 13; died, 4.

Mortality at different ages. Figures above the line relate to pharyngeal cases. Those below to laryngeal. Figures in brackets relate to cases intubated.

12 mos.		2d 12 mos.		3d 12 mos.		4th 12 mos.	
R.	D.	R.	D.	R.	D.	R.	D.
3	2	6	1	6	3	7	3
3(0)	6(5)	4(2)	14(13)	6(1)	11(8)	10(6)	6(6)

5th 12 mos.		5—9 yrs.		10—14 yrs.		15—30 yrs.	
R.	D.	R.	D.	R.	D.	R.	D.
17	2	24	1	14	1 meas.	53	1 T. P & alco.
8(6)		2(1)	3(2)				

R—recovered. D—died. 1(1) died 3½ hrs.

THE BENEFICIAL RESULTS OF ANTITOXINE.

Upon the local process :—In the half dozen cases in which I have made, or seen an injection made, within the first twenty-four hours of the disease, the results have been so remarkable that I have attributed them to the antitoxine. Following are the histories of two cases seen in private practice.

A boy 11 years old had had for twelve hours malaise, with pain on swallowing. Inspection showed the tonsils and portions of the palate to be covered with a soft, slightly adherent exudate. The boy was injected with 1000 units, and 12 hours later his throat was clear and temperature normal. I do not believe this would have been a severe case without antitoxine, but the effect seemed magical.

The second case was a baby one year old, with a slight croupy cough for twenty-four hours, and stenosis just beginning. Temperature 102, restless and without desire for food. Injected 500 units and found the baby the following morning practically well.

When the disease has progressed several days, and these cases are the ones seen in the hospital, the benefit is not so apparent. I believe, however, that a marked effect is still produced. In five months there has been only one case of pharyngeal or tonsillar diphtheria in which the membrane has increased after admission. I believe that the same

result has taken place in laryngeal diphtheria. Four of these did indeed require tracheotomy after intubation, but I doubt if there was any actual increase in the extent of the membrane. The pseudo-membrane itself has seemed to me to separate somewhat more quickly than formerly, there being usually seen after 36 to 48 hours a line of demarcation separating the membrane and making it look like a slough ready to be cast off. The swelling of the throat tissues and of the glands of the neck appear to me to begin to abate earlier than formerly. The ulcerated surface left in some cases is covered with a soft exudate until healing occurs some days later. In laryngeal diphtheria if the intubation could be put off for 18 hours it was avoided altogether. The time during which the cases remained intubated seem to me to be shorter than before the use of antitoxine. Many children coughed up their tubes in from 12 to 48 hours, and quite a number were able to do without them afterwards. Others required the tube from three to eight days. Exceptional cases occurred as previous to the use of antitoxine, when the tube had to be worn for weeks. In but four did tracheotomy have to follow intubation. These all died. The general condition of patients seems to me to be beneficially influenced. The loss of appetite and the apathetic condition are less apt to occur, and when present seem more quickly relieved.

The ill effects of antitoxine serum :—A small percentage of the cases had a slight rise of temperature immediately after the injection. As this is known to occur in a certain number of healthy children after an injection of serum for immunization, it is probably due to antitoxine. In seven cases abscesses developed at the seat of the injection. None of them were serious.

Rashes :—These are peculiar to the serum injections. They are undoubtedly partly due to the horse serum, not altogether to the antitoxine. The eruption may be limited

to the point of injection, or may more or less completely cover the whole body. It most often appears as an urticaria, but may resemble scarlet fever or measles. In some cases all the forms may be united in one person. Following the eruption, desquamation may occur. There were in the two hundred and fifty-five cases treated forty-eight having eruptions. In twelve of these there was a rise in temperature of from two to four degrees. This lasted from one to three days. In three children and one adult there was accompanying the rash great tenderness over the the joints of the extremities. These pains lasted, in all but one, for less than four days. This last was a child in which the joint affection was more serious. The child, aged fifteen months, was admitted on April 25, with severe stenosis. The temperature was 101. The child was intubated and did well. It received two injections of 1,200 units each. On the twenty-seventh day there was a macular eruption over the body; twenty-four hours later the joints of the hands and feet became intensely painful. The child dreaded the least handling. The knees and the two joints of the left thumb became more swollen, and appeared like acute articular rheumatism. Before the eruption developed, the child's condition was rendered more serious by the development of a broncho-pneumonia, which continued gradually to increase until death two weeks later. Examination after death showed pus in both knee joints and in the two joints of the thumb. The surrounding tissues were inflamed and thickened. Both lungs were the seat of extensive broncho-pnuemonia. The septic infection of the joints I regard as secondary to the inflammation caused by the antitoxine. The inflammation caused by it predisposed the joints to become the seat of a septic infection. This was the only case in which a complication caused by antitoxine seemed to have seriously influenced the health of the child. The urticaria or erythema, with at times accompanying rise of

temperature, is, indeed, in certain cases very distressing, and in a person already prostrated might not be wholly without danger to the patient. In no other cases than the one above did it seem, however, to influence the course of the disease.

I have seen no serious effects upon the heart, kidney or nervous system which I lay to antitoxine. Those of you who remember Dr. Winter's observations upon the first part of the cases reported here may wonder at this statement. He says that many babies have been brought to the Willard Parker Hospital with slight clinical evidence of diphtheria, babies, with the exception of a slight exudate in the throat and perhaps a slight croupy cough, that were apparently healthy and with rosy color. They remain in good condition for about ten days after the injection of antitoxine, when on entering the ward you hear a moan, etc., etc. These are the cases of antitoxine infection. The temperature charts show a record of 105 to 106 degrees. The symptoms may gradually subside, leaving the baby weak and extremely anæmic, or for days the temperature varies between 99 and 107. This, he says, is due to the action of antitoxine on the blood and is antitoxine septicæmia.

It would be difficult to recognize the children from the above picture. During the last four months there have been but eleven cases whose temperature reached 105 degrees, and only three 106 degrees. Eight of these fourteen cases had on admission severe laryngeal diphtheria, and were almost immediately intubated, and all but two of the fourteen had pneumonia during their high temperature. One of these two was septic from the beginning, dying on the sixteenth day, and the other was an eleven months child with tubercular ulcerations on arms and legs. This child steadily grew worse, and died of exhaustion. In the months before the use of antitoxine children with laryngeal

diphtheria, if they lived long enough, very frequently developed septic bronchitis or pneumonia. These children frequently had high temperatures before they died. As these cases, under the use of antitoxine, in no wise differed from those seen formerly, and as they were less frequent, it does not seem to me reasonable to attribute them to antitoxine. Later, Dr. Winters gave three examples of different kinds of antitoxine infection, one acting on the kidneys, one on the nervous system, and one causing convulsions. A reader not cognizant of the facts would suppose from his account that they were all mild cases. In fact all three were severe laryngeal diphtheria on admission. I will give his account of the first case and then that of the hospital records. His other two histories are equally misleading. In his pamphlet he states: "a second form of antitoxine infection was seen in the case of a little girl aged 13 months admitted March 22d. Given the first injection of antitoxine immediately; temperature before injection, 101.6; temperature six hours afterward, 104. Second injection, March 23d; afternoon of the same day, kidneys ceased to act. Hot pack and other methods of treatment resorted to. Baby died, in spite of all treatment, on afternoon of March 26th."

The hospital records add the following points: "The child Mary Quade was admitted after nine days of sickness; when received her throat and nostrils were filled with foul discharge. Abundant thin membrane covered tonsils, soft palate and pharynx. The child had intense dyspnœa and was intubated almost immediately after arrival. The day after admission paralysis developed, and fluids regurgitated through the nostrils." With these added facts we have a very different picture before us, and hardly need to lay the suppression of the urine or the fatal result to the 2000 units of antitoxine. Time does not permit me to further show why I believe his other statements give an equally wrong impression.

The limitations of antitoxine :—Diphtheria antitoxine, so far as we know, has no action upon the cells in causing them to resist any poisons other than those produced by the diphtheria bacilli. Here we see at once a limitation in the cure of the complex disease called diphtheria, for it is as correct for instance to class some of the cases met with as pneumonias complicated with diphtheria as to call them diphtheria complicated with pneumonia. Upon the pneumonia, so far as it is not due to the diphtheria bacillus, we cannot hope that the antitoxine will have any curative effect. Another limitation is suggested by the results of experiments in animals. We know that after the infection has proceeded but a moderate distance it cannot be arrested by antitoxine. Experience seems to show that in human beings also the cells no longer react to antitoxine after a certain degree of poisoning has taken place, and this point in some cases seems to occur very early. I doubt if we are justified in saying that in these the actual lesions have progressed so far that without any further poisoning life has become impossible. I believe it may be possible that even after the administration of antitoxine thē poison goes on producing further lesions.

There are cases in which even when the antitoxine is given early, it apparently fails to fortify the cells against the diphtheria poison.

In the hospital the effects of antitoxine upon laryngeal diphtheria, though in one way striking, are in another disappointing. More children live than formerly, but it seems as though still more should live. Many survive the acute infection, but many develop broncho-pneumonia later and die. It has occurred in cases of diphtheria treated with antitoxine just as in cases not so treated, that a relapse may take place four or five weeks after recovering from the disease.

I give here, in closing, two instances of antitoxine limit-

ation. Alice Means, aged 16 years, a girl strong and well nourished, was admitted to the hospital on the third day of her illness; the glands of her neck, both tonsils and the peritonsilar tissues were greatly swollen. The whole area extending back into the pharnyx was covered by a thick dirty-white adherent membrane, her nostils were partially obstructed; temperature 99, pulse 108. Her intellect was clear; 1000 units of antitoxine injected; same amount injected twenty-four hours later. Thirty hours after her admission the swelling and infiltration were much less; membrane had lessened and was of more benign character. Her heart was irregular, but patient felt better; temperature was 99 and pulse 110. Four days after her admission her heart action became much more irregular and her pulse was but 66, falling the next day to 34. Patient had repeated attacks of heart failure, all nourishment was vomited so that stimulants had to be given by rectum. Patient died on fifth day. Autopsy showed extreme fatty degeneration of the heart and extensive degeneration of the other organs.

The second case is the following: Child, aged 4 years, admitted on February 11th, on the second day of the disease; was well nourished, temperature 101, pulse 150, but of good quality; respiration 28. Examination showed the several glands moderately swollen, the tonsils to be much enlarged, but covered with only a moderate amount of membrane; nostrils free but showing some discharge. Three days later swelling of the glands of the neck less, exudate gone from the throat, temperature 103, pulse 156, with a trace of albumen in the urine. On the seventh day child had an attack of urticaria, pulse and temperature a shade lower, but considerable albumen in the urine; eyelids œdematous. The temperature then gradually rose until in two days it reached 105, and there remained until death on the sixteenth day of the disease. This child had two doses of 1500 units each.

The effects of the injection of antitoxine serum upon the blood of healthy children :—

Dr. J. S. Billings, Jr., one of the assistant bacteriologists of the Department, examined very carefully the blood in fifteen babies after they had received doses of antitoxine for immunization. The children received from 200 to 400 units each. No alteration was discovered in the red or white blood cells. The number of the white cells practically remained unchanged. The number of the red cells showed, however, in half of the cases, a very interesting change; in seven of the fifteen a gradual diminution in their number took place from day to day until by the sixth day there was a loss of from 200,000 to 600,000 in each 5,000,000 of their cells. After this date the number rapidly increased, until upon the fourteenth day the numbers had returned to their normal amount. In an adult receiving 1200 units the same result took place. From 6,000,000 the count dropped to 5,400,000, and then returned to the normal at the end of ten days. None of these persons showed any evidences of anæmia except in the examination of the blood. The cells contained their normal amount of hæmoglobin. The blood of a number of cases of diphtheria treated with antitoxine was compared with that in a number in which no antitoxine was used. The diminution in the number of the red blood cells was greater in those not receiving the antitoxine.

IMMUNIZATION AGAINST DIPHTHERIA.

The results in New York have been as remarkable as those obtained in Boston, as reported by Dr. Morrill. They have partly been published already, so that it is necessary to give them but very briefly.

* At the Mount Vernon branch of the New York Infant Asylum, a case of diphtheria developed on February 18,

* *New York Medical Record*, April 20, 1895. Report by Dr. Peck.

1894. Cases continued to develop from time to time, so that in September alone fourteen cases occurred. From that time until January 14th there was hardly a day in which a case did not develop. On January 16th and 17th 221 children were each injected with from 100 to 200 units Behring's serum. No bad effects were seen, and during the next month but one case of diphtheria developed. This was on the 14th day. From February 22d to 27th five cases appeared, and the children were again immunized. This time they each received from 125 to 225 units Behring's standard of a serum prepared under the direction of the New York City Health Department.

No case appeared after the second immunization for a period of five weeks. Cultures made from the throats of those in the neighborhood of this case showed diphtheria bacilli in the throats of six of the children. These six were given 200 units each on March 30th. One of these children developed a tiny patch two weeks later, but had no constitutional symptoms. A case developed on May 3d and one on May 27th in the children immunized on February 27th.

The Hospital has remained so nearly free of diphtheria that no third general immunization has been thought necessary.

* At the Nursery and Child's Hospital in the three weeks preceding April 18th, 1895, there were fifteen cases of diphtheria. Upon that day 136 children, varying in age from three weeks to four years, were immunized by receiving from 50 to 200 units each. The children showed no bad effects from the injections. A temporary rise in temperature occurred in one fourth of them, which lasted for six to twelve hours. From the day of the injections to the present time no diphtheria has developed in the hospital, with two very interesting exceptions — a physician and a nurse who had not been immunized.

* *New York Medical Record*, June 15, 1895. Report by Dr. Thomas.

Throughout New York City there have been over 200 persons immunized by the Health Department Inspectors in families where diphtheria has appeared. In only two of these has diphtheria occurred, and in these it developed within 24 hours. The lesions had probably already started before the injections were made. Both recovered.

CONCLUSION.

Diphtheria antitoxine has a distinct curative effect in diphtheria. The results are better when the injections are used early in the disease and when the diphtheria is uncomplicated with pneumonia or sepsis. The total amount required in the treatment of a case varies from 1000 to 4000 units Behring's standard, and is determined by the severity and duration of the disease and the weight of the patient.

An injection of 100 to 200 units of antitoxine in a person will give an almost certain immunity from diphtheria for four weeks. If security is desired for a longer period the injection must be repeated.

Diphtheria antitoxine will not cure all cases of diphtheria even if given early in the disease. It does not destroy the diphtheria bacilli. It is desirable therefore, with the antitoxine, to use other treatment, both local and constitutional.

The injection of diphtheria antitoxine with its accompanying horse serum is accompanied in a moderate percentage of the cases with disagreeable results, but in very few with any serious ones. No cases have been observed in which the kidneys showed any evidence of being seriously affected. It does not appear to have any deleterious effects on the blood, other than to cause a moderate temporary diminution in the number of red blood cells, and even this is more than counterbalanced by its lessening the action of the diphtheria poison.

DISCUSSION.

Dr. Charles F. Withington, of Roxbury.—The most important question that occurs to us as clinicians, is "Has antitoxine any curative value in diphtheria?" On this point I have some figures to which I will call your attention. They are obtained from the records of the City Hospital in Boston since the middle of 1890 when the "contagious service" was established. For six months of the year 1890, from July, there were 138 cases with 58 deaths,—a mortality of 42 per cent. The following year, 1891, there were 233 cases with 105 deaths,—45 per cent. The next year, which was one of thirteen months to February 1, 1893, there were 376 cases with 185 deaths,—mortality of 49 per cent. In 1894 there were 389 cases with 203 deaths, or 52 per cent., showing a progressive increase in mortality every successive year, up to that which ends with the first of January 1894. Coming now to the year which has just closed, with the first of February 1895, antitoxine was used during the last seven weeks of that year, and during the first forty-five weeks the cases were treated in the old way. The average mortality for the previous four years is 48 per cent. In the year 1895 there have been 698 cases with 266 deaths, or a mortality of 38 per cent., or a fall of 10 per cent. from the average of four years. As to whether that diminution was a continuous one during the whole year or was limited to certain parts of the year: for the first forty-five weeks of the year, during the time that no antitoxine was used, there were 578 cases with 244 deaths, or a mortality of 42 per cent.; during the last seven weeks, when all the severe cases were treated by antitoxine, there were 120 cases with 26 deaths, or a mortality of 21 per cent., exactly one half of the mortality for the previous forty-five weeks, and, you see, comparing still more favorably with the 48 per cent. which is the mortality for the whole period of four or five years previous to the use of antitoxine.

During these seven weeks it was my privilege to be on duty at the hospital and to use the antitoxine in these cases. The figures in regard to that treatment have been published, and I shall not trouble you to go into them again further than to say that, of these 120 cases during that period, only

80 were treated with antitoxine because the material was not sufficient to supply all the cases, and the remaining 40, mostly milder cases, were left alone so far as antitoxine was concerned. Of those 40 cases, 12 died, or 30 per cent.; the 40 cases included the mild ones and a few moribund ones where it was hopeless to give the material. Of the 80 severer cases 14 died, or a mortality of 17 per cent., and taking all the 120 cases together, those treated without and those with, the mortality is as I have stated, 21 per cent. That is one answer to the important question as to whether antitoxine has any curative value. That question does not mean whether it will cure all cases, for the limitations have been carefully and accurately stated by Dr. Park, but that it has a beneficial effect upon the general mortality of a hospital and of any community in which it is used seems to me without much doubt.

A second question is, "Has the remedy any unfavorable effects?" The answer must be yes, a few. These are chiefly the cutaneous eruptions, which are awkward and uncomfortable, but not dangerous. I never have seen but one case where I felt that the use of antitoxine was open to criticism on account of safety. Within a week or two in private practice I have had a case where I had a good deal of anxiety, not to say alarm, from the use of it. It was the case of a lady with well marked diphtheria involving one tonsil. As promptly as possible she received 1500 units of the Behring solution, and with the effect of almost immediate amelioration of the symptoms so far as appearance of the throat went. Two days later the other tonsil began to be involved with rapidly increasing membrane. She again received 1500 units and with the result that after four or five days the throat was clear of membrane, and bacteriological examination showed it to be clear of the bacilli. But following that for about a week she was in a condition of a good deal of gravity characterized first by local erythema, then general erythema, then intense urticaria, then by purpura of a good deal of severity involving both legs, and by severe pains accompanying the course of the nerves and possibly due to a neuritis. Her condition was one of high fever, delirium and a good deal of prostration. She has come out of it and is now convalescent from the

disease. The gravity of the symptoms referable to antitoxine in this case will lead me in the future to be a little conservative in its use in cases which appear at the beginning likely to be pretty mild. But while it has its limitations, and while it has its accidents and ill effects in certain cases, it seems to me to possess the great preponderance of advantage in the treatment of severe cases, and I believe that the reduction of mortality at any rate far offsets any of those ill effects which we sometimes see.

Dr. George G. Sears, of Boston.—It has seemed to me, after listening to this series of able papers on the subject of diphtheria and its treatment, that the most interesting way in which I could take part in the discussion would be to give an account of the results obtained at the Boston City Hospital with antitoxine from February 1st, the date at which Dr. Withington's observations end, to May 31st. In the short time which is allotted me it will be possible to give these results in a rather broad way only, reserving fuller details for some other occasion.

Whatever may be thought of the value of statistics in proving the worth of any form of treatment, it is certain that antitoxine for the present, at least, will be judged chiefly by the figures which are supplied by institutions in which a large number of cases of diphtheria are treated. Yet for purposes of comparison between the present and the past, there is a decided choice in the way such figures are presented. The mortality rate may be deduced only from the cases in which the serum was injected, or it may be made up from the total number admitted, whether they received it or not. So long as it was not withheld from a lack of supply, but only because the disease either seemed too mild to require it or had already reached the stage where no treatment could avail, the latter method seems unquestionably the fairer, since it entirely eliminates the personal factor in the selection of cases, and gives no ground for the suspicion that the severe ones failed to receive treatment, lest they should spoil the statistics. In the present instance, however, the difference is very slight.

In gathering the following figures, based on the cases admitted between February 1st and May 31st of this year,

I have not made the bacteriological examination the supreme test, since I have included several fatal cases which either died so soon after entrance that no cultures were made, or else were such typical cases that the failure to find bacilli on one or two attempts seemed without much doubt to be due to accident. In every case which recovered, however, the diagnosis was made in the laboratory. As a result a higher death rate is given than perhaps actually occurred, but if antitoxine can stand this form of treatment so much more credit is due it. Under this classification within the period mentioned above 238 cases were admitted, of whom 60 died—193 being treated with antitoxine, with 47 deaths. If these figures be added to Dr. Withington's, which have already been reported, a total of 358 cases and 86 deaths is given, with a percentage of 24, as opposed to 290 admissions during the same period last year, with 137 fatalities (47.2 per cent.). If we exclude 36 cases which entered moribund, and died within forty-eight hours, and six whose death was not connected with diphtheria, the mortality rate is reduced to 13.9 per cent. A comparison of the results obtained in the operative cases, either intubation or tracheotomy, is just as striking, not only in the proportion of recoveries but also in the marked reduction in the number in which such interference was necessary. Of the 290 cases treated a year ago, 77 (26.5 per cent.) required operation, only nine recovering, while in the larger number treated this year operation was necessary in but 41 (11.5 per cent.), and of these 17 recovered. Of the 24 deaths, 14 occurred within twenty-four hours after admission, while 10 received no antitoxine. Of the 31 cases treated by the serum 17 recovered, 54.8 per cent., while in 7 of the 14 fatal cases operation, injection and death all occurred within twenty-four hours after entrance. As I look back over the past few months I do not think that this marked improvement can be accounted for by any change in the severity of the disease. It has seemed to me that the normal number of serious cases had been admitted, an opinion which is shared by other men who have been following the work there, while similar results obtained in other hospitals all over the world make it extremely improbable that so sudden and universal a change should have occurred. Nor

do I think that the smaller number of operative cases and the larger number of recoveries are to be accounted for by any alteration in the type of the disease, but rather that the reduction in the number of such cases, judging from the effect produced in the visible membrane in the throat, is due to the action of antitoxine, partly in preventing the extension of the membrane downwards, and partly in arresting its further development in cases where the larynx is already involved and in hastening its disappearance; since time and again patients were admitted on the border line of operation, in whom the disquieting symptoms rapidly subsided under antitoxine, steam and calomel sublimations. That antitoxine does not always shorten the time during which the tube is worn is sufficiently well shown by the fact that it was not permanently removed till the seventh day in one patient, the eighth in one, the tenth in one, the twelfth in one and the eighteenth in another. Of the other 11 successful cases it was worn one day by one,* two days by two, three by one, four by two, five by four, and six by one; the average time being six days.

Regarding the local changes in the visible membrane in the throat, in none of the cases which have come under my own observation have any extraordinary effects been seen; although large pieces have occasionally exfoliated as under any form of treatment, it has usually disappeared in a perfectly orderly manner. The most remarkable effect produced in the membrane has been its failure to extend except in rare instances, and in many of these the advance seemed to have been permitted by the small size of the dose, a second injection being often sufficient to check further progress; as a result the active stage of disease is shortened, the membrane disappears sooner, since less is formed, septic absorption is diminished, and the swelling of the cervical glands and the infiltration of the tissues of the neck rapidly subside. In some of the cases, even of those accompanied by the constant oozing of a fetid bloody discharge from nose and mouth, where sepsis had already produced such serious cellular changes that recovery was impossible, the local effect on the membrane and the improvement in the child's sense of comfort and in his

* This patient died six weeks later, of scarlatina.

mental condition seemed to justify its use. It has often seemed in such cases that antitoxine had done all that could be expected of it in counteracting the diphtheria toxine, the patient dying not because it had failed to do its proper work, but because it is no more able to excite a dead cell than is electricity to stimulate a dead muscle. Such failures suggest that these cases might have been saved by an early injection, but the death of a few where treatment was begun within the first two days proves that some other factors beside time are at work, which may not be clinically evident, perhaps a mixed infection.

The story of antitoxine is, however, not all told in chronicling only its good effects; unfortunate accidents have undoubtedly followed its use, but the cases which have come under my own observation have been practically free from such results. Various forms of skin eruptions have been comparatively frequent and have at times been attended by considerable constitutional disturbance and fever and the appearance of a trace of albumen in the urine, but the condition of the patient was never such as to give rise to anxiety. In some half a dozen of these cases the joints became swollen, tender and painful, but this almost invariably passed off within forty-eight hours. Rarely after one injection the eruption reappeared ten or twelve days later, the relapse being at times accompanied by more serious symptoms than occurred with the first manifestation.

In a disease where complications are common under any form of treatment, the evidence must be very conclusive before the charge that antitoxine is responsible for the occurrence of endocarditis, broncho-pneumonia, nephritis and paralysis can be sustained, and is not supported by the cases now under consideration. In order to determine in what proportion such complications existed I have gone carefully over the records of these 238 cases, but regret that the figures obtained can be regarded as only closely approximate, since the histories are not always sufficiently explicit, but when doubt existed I have tried to err on the side against antitoxine. All cases, for example, have been classed as broncho-pneumonia in which slight signs in the lungs, as noted in the records, were accompanied by a rise in the respirations and temperature, though in many of them the process in

all probability was confined to the bronchi, and I have also included those cases in which it developed during the course of scarlet fever acquired subsequent to admission. Those in which it existed prior to the injection are naturally excluded. Under such a system twenty-five instances were found, in eleven of which it evidently contributed to the patient's death. The occurrence of traces of albumen in the urine was common, as it always has been, at times immediately following the injection of the serum, once or twice in large amount. In a certain proportion of the cases, as Dr. Morrill's statistics show, this must be looked upon as its result, though in others it was probably an accidental coincidence. In a few cases in which both a chemical and microscopic examination of the urine was made before and after its use by Dr. Ogden, no change was discovered. In only twenty-five cases did the amount of albumen rise to as much as a large trace as reported from the laboratory, while in only one, the fatal issue being preceded by convulsions, could the condition of the kidneys be considered as taking more than a very remote part in causing death.

The discovery of only four cases of paralysis among the records, only one of which seemed likely to be serious, may be in part accounted for by the fact that it is often of late development, and may have come on after the patient's discharge. It is also possible that some slight cases, when it was confined to the throat, were overlooked, but the figures even then give no support to the idea that it is more common after antitoxine than under other circumstances. Cases where systolic murmurs developed in the cardiac area were sufficiently common, and many of them persisted till the patient's discharge; but as most of the patients were under observation but a short time it is impossible to say how many were permanent, and statistics on this subject would have little value either way.

With the use of antitoxine as a prophylactic measure my experience is limited to about a dozen cases, all of whom escaped the disease. The infection of the two gentlemen who preceded me in charge of the wards, and my own escape after an immunity dose of 250 units of Behring's serum, is probably nothing more than an odd coincidence.

Before the eighth of April almost all of the cases were treated by Behring's antitoxine, or that furnished by the Pasteur Institute of New York; but in a few instances Aronson's was also used; since then a supply has been most generously provided by our State Board of Health, sufficient for most of the patients who needed it, and I am very glad of this opportunity to acknowledge our indebtedness to them, and to congratulate them on the prompt way in which their material was furnished to the profession, and the success which has attended its use.

Under ordinary circumstances the patients received a dose varying from 500 to 1500 units on the day of entrance, and again on the following day or the day after, if the progress of the case seemed to require it. In a few of the fatal cases very much larger amounts were given, while some of the successful results followed the injection of 100 c.c. (1–50,000) of the State Board of Health product given in the course of six or seven days. Contrary to the opinion which I understood Dr. Park to express, there seemed at times a distinct advantage in these large doses.

The anterior and outer surface of the thigh was the site usually selected for the insertion of the needle, and the local reaction was usually slight, though a few of the children complained of considerable pain on movement of the leg for the first twenty-four hours or so. In order to avoid the possibility of any interference with the performance of their duties by lameness, several of the house officers, who took an immunity dose, selected the upper arm for the seat of the injection, and in nearly every instance it was followed by marked swelling, which was accompanied by intense itching. In four or five cases an abscess resulted, but as this also followed in a few instances during the same period the hypodermic injection of a drug, and ceased after a serious conversation with those who were responsible for the administration of the serum, they were probably the result of some failure in technique.

Other treatment consisted in the use of iron, brandy and the cardiac stimulants, feeding by the nasal tube being resorted to in appropriate cases with apparently brilliant results. The only local treatment was the irrigation of the nose and throat, when the child did not resist too strenu-

ously, with a normal salt solution, or with Dobell's. After the membrane had disappeared, an effort was made to hasten the departure of the bacilli with mild peroxide of hydrogen solutions, boracic acid or lemon juice. Croupy cases were treated with steam and calomel sublimations.

In conclusion I would say that the careful observation of these cases, most of which were under my care during a portion at least of their illness, has changed my position from that of a good deal of scepticism regarding the value of antitoxine to one of considerable optimism. While it has not fully justified all the claims of its most ardent supporters, since death sometimes occurs even when the injections are made early in the disease, in cases which seem clinically appropriate, a marked reduction in the mortality rate has followed its use. In the rank and file of cases the exfoliation of the membrane is hastened, the amount of septic absorption is diminished, and the danger from this source therefore decreased, while of those which are complicated by laryngeal stenosis, a smaller proportion require operation, and of these a relatively larger number recover. Even in hopeless cases the membrane may clear up under its use, while its effects in counteracting the diphtheria poison are frequently seen in the brighter mental condition and improved sense of well being of the patient. Unfortunate results have occasionally followed, perhaps from some idiosyncrasy on the part of the patient, perhaps from some chemical change or decomposition in a particular specimen, but whatever its cause, in the face of its many advantages, such accidents should no more deter us from its use than the occasional death from ether should prevent its employment as an anæsthetic, though it might suggest some limitation to its administration as a routine practice to every patient. Even if all the cases of broncho-pneumonia or albuminuria which were observed could be ascribed to it — an impossible task in a disease where such complications are common under any form of treatment — they are more than offset by a reduction of fifty per cent. in the mortality rate.

Massachusetts Medical Society.

PROCEEDINGS.

CONTENTS OF APPENDIX.

Massachusetts Medical Society.

PROCEEDINGS OF THE COUNCILLORS.

October 5, 1892.

A Stated Meeting of the Councillors was held in the hall of the Medical Library Association, No. 19 Boylston Place, Boston, on Wednesday, October 5, 1892, at 11 o'clock, A.M.

The President, Dr. James C. White, in the chair.

The following Councillors were present:

Bristol North.
S. D. Presbrey.

Bristol South.
G. DeN. Hough.

Essex North.
M. D. Clarke,
H. G. Leslie,
G. W. Snow.

Essex South.
H. Colman,
J. W. Goodell,
A. H. Johnson,
O. S. O'Brien,
G. S. Osborne,
P. L. Sanborn.

Hampshire.
D. W. Miner.

Middlesex East.
J. M. Harlow.

Middlesex North.
H. R. Brissett,
N. B. Edwards,
C. P. Spalding.

Middlesex South.
C. H. Cook,
D. M. Edgerly,
W. Ela,
J. L. Harriman,
R. L. Hodgdon,
H. Holmes,
L. R. Stone,
J. L. Sullivan,
G. E. Titcomb,
C. E. Vaughan,
H. P. Walcott,
A. Worcester.

Norfolk.
E. H. Baxter,
A. W. Blair,
F. H. Brown,
W. Channing,
B. E. Cotting,
A. H. Hodgdon,
A. R. Holmes,
J. Kittredge,
A. P. Perry,
C. E. Stedman,
C. R. Whitcombe.

Plymouth.
W. G. Brown,
H. W. Dudley,
F. G. Wheatley.

Suffolk.
S. L. Abbot,
J. B. Ayer,

H. J. Barnes,
E. H. Brigham,
F. E. Bundy,
H. L. Burrell,
J. F. Bush,
J. R. Chadwick,
D. W. Cheever,
E. G. Cutler,
F. W. Draper,
R. H. Fitz,
C. F. Folsom,
C. M. Green,
F. B. Greenough,
W. H. H. Hastings,
J. Homans,
W. Ingalls,
F. I. Knight,
A. L. Mason,
J. H. McCollom,
F. Minot,
A. B. Morong,
C. B. Porter,
A. Post,
C. P. Putnam,
W. L. Richardson,
A. D. Sinclair,
A. M. Sumner,
G. G. Tarbell,
J. C. White,
W. F. Whitney,
E. N. Whittier.

Worcester.

M. Bemis,
P. P. Comey,
G. E. Francis,
L. Wheeler.

Worcester North.

E. J. Cutler.

Total, 80.

The record of the previous meeting was read and accepted.

The following were appointed Delegates to other State Medical Societies:

Vermont.—Drs. J. B. Field, of Lowell; L. D. Woodbridge, of Williamstown.

New York.—Drs. F. K. Paddock, of Pittsfield; F. C. Shattuck, of Boston.

New York State Medical Association.—Drs. H. P. Walcott, of Cambridge; G. W. Davis, of Holyoke.

The Committee on Membership and Finances reported through Dr. Minot.

In accordance with their recommendation, it was voted that the following be elected to honorary membership in the Society:

George Lincoln Goodale, of Cambridge.

On recommendation of the same Committee, it was voted that the following become a retired member:

Justin Allen, of Topsfield.

Also, that the following be dropped from the roll, having lost membership under By-Law VI., by removal from the State:

G. H. Gardner, of New London, N. H.
A. Lavoie, of Sillery, P. Q.
C. J. Nickerson.

D. P. Richardson, of Sandy Hook, Conn.
A. W. Wilmarth, of Morristown, Pa.
A. Winn, of Galesburgh, Ill.

The Committee to which was referred at the last meeting the petition of M. E. Webb and others, for a change in the boundary line between the Norfolk and Suffolk Districts, reported through Dr. Vaughan, and recommended that the following boundary line be substituted for that previously adopted in 1876:

Beginning at Dorchester Bay, opposite the easterly end of Preble Street, the line shall run in a general northwesterly direction through the middle of Preble and Swett Streets to Northampton Street; then by the middle of Northampton Street to Washington Street; then by the middle of Washington Street to Camden Street; then by the middle of Camden and Gainsborough Streets to Huntington Avenue; then by the middle of Huntington Avenue to the Huntington Avenue entrance of the Back Bay Park; then across the Park westerly to the water-way known as Muddy Brook; then by Muddy Brook to St. Mary's Street; then by the middle of St. Mary's Street to the Charles River.

The report of the Committee was accepted, and its recommendations were adopted.

The Committee appointed at the last meeting concerning dues for the commitment of the Insane reported, through Dr. Folsom, that it is not expedient to ask for any further legislation in regard to the commitment of the Insane.

The report of the Committee was adopted.

The Committee to which was referred at the last meeting a letter regarding the Pan-American Medical Congress reported, through Dr. Whittier, that it is inexpedient for the Society to take action thereon.

The report of the Committee was adopted.

Adjourned at 11.45 A.M.

FRANCIS W. GOSS,
Recording Secretary.

February 1, 1893.

A Stated Meeting of the Councillors was held in the hall of the Medical Library Association, No. 19 Boylston Place, Boston, on Wednesday, February 1, 1893, at 11 o'clock, A.M.

The President, Dr. James C. White, in the chair.

The following Councillors were present:

Bristol North.
H. B. Baker.

Bristol South.
W. A. Dolan.

Essex North.
H. G. Leslie,
J. F. Young.

Essex South.
H. Colman,
H. J. Gaffney,
A. H. Johnson,
O. S. O'Brien,
P. L, Sanborn,
S. W. Torrey.

Middlesex East.
A. H. Cowdrey,
J. M. Harlow.

Middlesex North.
H. R. Brissett,
J. J. Colton,
N. B. Edwards,
W. B. Jackson,
W. H. Lathrop,
C. P. Spalding.

Middlesex South.
Z. B. Adams,
W. A. Bell,
C. H. Cook,
T. M. Durell,
W. Ela,
E. G. Hoitt,
H. Holmes,
J. T. G. Nichols,
L. R. Stone,
J. L. Sullivan,
G. E. Titcomb,
C. E. Vaughan,
H. P. Walcott,
J. W. Willis,
A. Worcester.

Norfolk.
E. H. Baxter,
A. W. Blair,
W. P. Bolles,
H. W. Broughton,
F. H. Brown,
W. Channing,
B. E. Cotting,
R. T. Edes,
D. D. Gilbert,
A. R. Holmes,
J. Kittredge,
E. C. Norton,
A. P. Perry,
I. W. Starbird,
J. Stedman.

Norfolk South.
J. H. Gilbert.

Plymouth.
H. W. Dudley,
B. F. Hastings,
F. G. Wheatley.

Suffolk.
S. L. Abbot,
J. B. Ayer,
H. J. Barnes,
A. N. Blodgett,
E. H. Brigham,
F. E. Bundy,
H. L. Burrell,
J. F. Bush,
J. R. Chadwick,
D. W. Cheever,
J. W. Cushing,
F. W. Draper,
T. W. Fisher,
R. H. Fitz,
C. F. Folsom,
M. F. Gavin,
C. M. Green,
J. O. Green,
W. H. H. Hastings,
W. C. Holyoke,
J. Homans,
W. Ingalls,
B. J. Jeffries,
A. L. Mason,
J. H. McCollom,
F. Minot,
C. P. Putnam,
W. L. Richardson,
T. M. Rotch,
G. B. Shattuck,
B. S. Shaw,
A. D. Sinclair,
A. M. Sumner,
C. W. Swan,

	Worcester.	J. O. Marble,
G. G. Tarbell,	A. G. Blodgett,	G. C. Webber,
J. C. Warren,	W. Davis,	L. Wheeler.
A. P. Weeks,	G. E. Francis,	
J. C. White,	E. B. Harvey,	*Worcester North.*
E. Wigglesworth,	J. W. Hastings,	J. M. Blood,
H. W. Williams.	S. P. Holbrook,	E. J. Cutter.
	H. A. Jewett,	Total, 104.

The record of the last meeting was read and accepted.

The following were appointed Delegates to other State Medical Societies:

Maine.—Drs. E. W. Cushing, of Boston; F. W. Anthony, of Bradford.

New Hampshire.—Drs. E. B. Harvey, of Westboro'; C. P. Morrill, of North Andover; T. H. Gage, of Worcester.

Rhode Island.—Drs. J. L. Hildreth, of Cambridge; W. N. Swift, of New Bedford.

Connecticut.—Drs. J. A. Gordon, of Quincy; F. W. Chapin, of Springfield.

New Jersey.—L. R. Stone, of Newton; L. F. Woodward, of Worcester.

The following Committees were appointed:

To Audit the Treasurer's Accounts.—Drs. E. P. Gerry, G. G. Tarbell.

To Examine the By-Laws of District Societies.—Drs. S. D. Presbrey, F. W. Chapin. H. J. Barnes.

To fill vacancy in the Committee on Medical Diplomas.—Dr. E. N. Whittier.

The Committee on Membership and Finances reported through Dr. Minot. In accordance with their recommendation it was voted that the following be dropped for five years' delinquency in assessments;

D. E. Thayer, of Adams.

The Committee on Publications reported, recommending as follows:

That the Triennial Catalogue to be issued this year shall contain the names of all past and present members of the Society, so far as known.

Voted, To adopt the recommendation of the Committee.

The Committee appointed in February, 1892, to report on what changes, if any, may be necessary or expedient to secure uniform examination of candidates for Fellowship, reported through Dr. Burrell.

After discussion it was voted, that the report be laid on the table, put in print, and sent to all members of the Council.

The Committee on the bill for the creation of a Cabinet Officer of Public Health reported through Dr. Walcott, and recommended the passage of the following:

That the Congress of the United States be requested to create a National Sanitary Authority, which shall be independent of the Army, the Navy, or the Marine Hospital Service.

Voted, That the report be accepted, and its recommendations adopted.

Dr. Cheever, in behalf of a Committee from the Suffolk District appointed to consider the question of the desirability of further sanitary legislation, presented the following resolutions, which were adopted:

1. It is advisable that a central National Board of Health, with efficient authority, should be established, with all necessary control over immigration.

2. It is highly important that a system of National Quarantine be created, which shall have absolute control over all ports and other entrances to the United States.

Voted, That these resolutions be forwarded to the appropriate authorities at Washington.

Adjourned at 12.15 P M.

FRANCIS W. GOSS,
Recording Secretary.

June 13, 1893.

The Annual Meeting of the Councillors was held in the hall of the Medical Library Association, No. 19 Boylston Place, Boston, on Tuesday, June 13, 1893, at 11 o'clock, A.M.

The President, Dr. James C. White, in the chair.

The following Councillors were present:

Barnstable.
T. R. Clement,
G. W. Doane,
C. M. Hulbert.

Berkshire.
J. F. A. Adams,
O. J. Brown,
W. A. Smith,
A. B. Withington.

Bristol North.
F. A. Hubbard,
S. D. Presbrey.

Bristol South.
W. T. Learned.

Essex North.
B. W. Bartlett,
H. J. Cushing,
H. G. Leslie,
J. F. Young.

Essex South.
H. Colman,
A. H. Johnson,
E. A. Kemp,
C. C. Pike,
C. C. Sheldon.

Hampden.
E. C. Collins,
C. P. Hooker.

Hampshire.
S. A. Clark.

Middlesex East.
S. W. Abbott,
J. S. Clark,
S. W. Kelley,
G. W. Nickerson.

Middlesex North.
H. R. Brissett,
H. B. Howard,
W. B. Jackson,
C. P. Spalding,
J. B. Wentworth.

Middlesex South.
Z. B. Adams,
W. H. Baker,
W. A. Bell,
R. A. Blood,
E. R. Cutler,
C. K. Cutter,
T. M. Durell,
J. F. Frisbie,
A. G. Griffin,
H. Holmes,
J. A. Mead,
J. T. G. Nichols,
G. A. Oviatt,
E. H. Stevens,
L. R. Stone,
J. L. Sullivan,
G. J. Townsend,
C. E. Vaughan,
H. P. Walcott,
J. W. Willis.

Norfolk.
E. H. Baxter,
A. W. Blair,
W. P. Bolles,
W. Channing,
A. B. Coffin,
A. R. Holmes,
E. C. Norton,
A. P. Perry,
M. V. Pierce,
O. F. Rogers,
I. W. Starbird,
C. E. Stedman,
G. B. Stevens,
J. A. Winkler,
H. W. White.

Norfolk South.
T. H. Dearing,
J. F. Welch.

Plymouth.
F. G. Wheatley.

Suffolk.
S. L. Abbot,
J. B. Ayer,
H. J. Barnes,
A. N. Blodgett,
E. H. Brigham,
F. H. Brown,
F. E. Bundy,
J. F. Bush,
A. T. Cabot,
B. F. Campbell,
J. R. Chadwick,
J. W. Cushing,
E. G. Cutler,
R. H. Fitz,

C. F. Folsom,
E. J. Forster,
C. M. Green,
F. B. Greenough,
W. H. H. Hastings,
W. C. Holyoke,
W. Ingalls,
B. J. Jeffries,
F. I. Knight,
A. L. Mason,
J. H. McCollom,
F. Minot,
A. B. Morong,
A. H. Nichols,
J. M. Putnam,
W. L. Richardson,
T. M. Rotch,
F. C. Shattuck,
G. B. Shattuck,
A. D. Sinclair,
A. M. Sumner,
C. W. Swan,
G. G. Tarbell,
J. C. Warren,
J. C. White,
W. F. Whitney,
E. N. Whittier.

Worcester.
G. E. Francis,
E. B. Harvey,
J. W. Hastings,
S. P. Holbrook,
J. O. Marble,
E. R. Wheeler,
L. Wheeler.

Worcester North.
R. F. Andrews,
L. W. Baker,
J. M. Blood,
L. G. Chandler.

Total, 121.

The record of the previous meeting was read and accepted.

The Secretary read the names of new and of deceased Fellows.

The Treasurer, Dr. Forster, read his annual report.

The Auditing Committee reported that they found the Treasurer's accounts correctly cast and properly vouched, and that he has in his possession the various securities and funds called for.

The Treasurer's report was then accepted.

The Committee on Membership and Finances reported through Dr. Minot and recommended that $1400.00 of the surplus in the treasury be distributed among the District Societies.

The recommendation of the Committee was adopted.

On recommendation of the same Committee it was voted that the following be allowed to retire:

W. C. B. Fifield, of Dorchester.
F. C. Greene, of Easthampton.
Eben Jackson, of Somerville.
William Leach, of Vineyard Haven.
S. M. Logan, of Jamaica, W. I.
E. G. Tucker, of Boston.

A. M. Smith, of Williamstown.
J. B. Whitaker, of Fall River.

Also, that the following be allowed to resign:

Horace Clark, of Buffalo, N. Y.
Richard Frothingham, of New York, N. Y.

Also, that the following have lost Fellowship under By-Law VII. for five years' delinquency in payment of assessments:

E. C. Hebbard, of Boston.
J. C. Lincoln, of Hyde Park.

Also, that the following have lost Fellowship under By-Law VI. by removal from the State:

J. W. Dudley, of Minneapolis, Minn.
W. E. Faulkner, of Keene, N. H.
E. R. P. Fourtin, of Butte, Mont.
M. A. Jewett, of Siros, Turkey.
H. R. Kellogg, of Chicago, Ill.
Andrew McFarlane, of Albany, N. Y.
H. F. Titus, of Seattle, Wash.
M. A. Walker, of Denver, Col.

Also, that the following be restored to membership:

John Zebulon Currie, of Cambridge.
Timothy Edward McOwen, of Lowell.

The Committee on Publications presented its report.

The Committee on Medical Diplomas reported through Dr. Forster.

The Librarian, Dr. Brigham, presented his report.

The Committee on Nominations reported a list of candidates for the offices of the Society for the ensuing year, and the same were elected by ballot:

President . .	Dr. James C. White, of Boston.
Vice-President .	Dr. Zabdiel B. Adams, of Framingham.
Treasurer . .	Dr. Edward J. Forster, of Boston.
Corresponding Sec'y	Dr. Charles W. Swan, of Boston.
Recording Secretary	Dr. Francis W. Goss, of Roxbury.
Librarian . .	Dr. Edwin H. Brigham, of Boston.

Dr. Reginald H. Fitz, of Boston, was chosen Orator, and

Dr. Silas D. Presbrey, of Taunton, Anniversary Chairman, for the Annual Meeting of the Society in 1894.

Voted,—That the next Annual Meeting of the Society be held in Boston, on the second Wednesday in June, 1894.

On nomination by the President, the following Standing Committees were appointed:

Of Arrangements.

F. M. Briggs, J. C. Monro, A. K. Stone,
H. Jackson, A. Thorndike, J. G. Mumford.

On Publications.

B. E. Cotting, O. F. Wadsworth, G. B. Shattuck.

On Membership and Finances.

F. W. Draper, J. Stedman, E. G. Cutler,
L. R. Stone, A. H. Johnson.

To Procure Scientific Papers.

H. P. Walcott, H. L. Burrell, L. Wheeler,
F. H. Zabriskie, S. B. Woodward, C. W. Townsend.

On Ethics and Discipline.

G. J. Townsend, G. E. Francis, F. C. Shattuck,
C. G. Carlton, E. Cowles.

On Medical Diplomas.

E. J. Forster, H. E. Marion, E. N. Whittier.

Voted,—That the thanks of the Councillors be presented to Dr. Minot for his long and able service as chairman of the Committee on Membership and Finances.

On motion, the report of the Committee on securing uniformity in Censors' examinations, presented at the last meeting, was taken from the table.

Dr. McCollom stated that the report was presented as the result of much labor on the part of the Committee. That it had met with the approval of many members of the various Boards of Censors.

Dr. Harvey objected to the report, in that it exceeded the

limitations of the Charter, and could not be passed without permission from the State legislature.

After discussion by Drs. Johnson, Nichols and Forster, it was voted that the subject be referred to a new Committee to be appointed by the chair, of which the President himself shall be a member.

The following were appointed to constitute the Committee, consisting of the President and one member from each District Medical Society:—

Drs. J. C. White, *President;* G. W. Doane, Barnstable District; J. F. A. Adams, Berkshire; F. A. Hubbard, Bristol North; B. J. Handy, Bristol South; R. B. Root, Essex North; A. H. Johnson, Essex South; A. C. Deane, Franklin; W. H. Pomeroy, Hampden; D. W. Miner, Hampshire; S. W. Kelley, Middlesex East; H. B. Howard, Middlesex North; E. R. Cutler, Middlesex South; M. V. Pierce, Norfolk; J. F. Welch, Norfolk South; H. F. Borden, Plymouth; J. H. McCollom, Suffolk; E. B. Harvey, Worcester; F. H. Thompson, Worcester North.

Dr. Harvey moved, and it was voted, that the question of the advisableness of the continuance of the purchase of Braithwaite's Retrospect, and its distribution to Fellows of the Society, be referred to the Committee on Publications to report at the next meeting.

Adjourned at 12.40 P.M.

FRANCIS W. GOSS,

Recording Secretary.

Massachusetts Medical Society.

PROCEEDINGS OF THE SOCIETY.

ANNUAL MEETING.

First Day.

Sectional meetings of the Society were held in the Building of the Massachusetts Charitable Mechanic Association, Boston, on Tuesday, June 13, 1893, at 2 o'clock, P.M.

The sections were organized and papers were presented as follows:

SECTION IN MEDICINE.

Dr. J. C. White, of Boston . . . . . Chairman.
Dr. R. W. Greenleaf, of Boston . . . . . Secretary.

The Influence of College Life on Health.—By Drs. Grace A. Preston, of Northampton; Edwin Farnham, of Cambridge; W. M. Conant, R. W. Greenleaf, of Boston; C. H. Cook, of Natick. Discussion by Drs. H. P. Walcott, S. W. Driver, of Cambridge.

The Treatment of Pneumonia.—By Dr. F. C. Shattuck, of Boston. Discussion by Drs. William Osler, of Baltimore, Md.; G. K. Sabine, of Brookline; A. L. Mason, of Boston.

SECTION IN SURGERY.

Dr. C. B. Porter, of Boston . . . . . Chairman.
Dr. C. L. Scudder, of Boston . . . . . Secretary.

How should the General Practitioner deal with Strangulated Hernia?—By Dr. A. G. Gerster, of New York City. Discussion by Drs. C. C. Odlin, of Melrose; William Bass, of Lowell; H. H. A. Beach, John Homans, A. T. Cabot, C. B. Porter, of Boston.

At 8 o'clock, P.M., the Shattuck Lecture was given by Dr. William Osler, of Baltimore, Md.

FRANCIS W. GOSS,
Recording Secretary.

Second Day.

The Society met in Mechanic Building, Boston, on Wednesday, June 14, 1893, at 9 o'clock, A.M., for the exercises of the one hundred and twelfth Anniversary.

The President, Dr. James C. White, in the chair.

The record of the last annual meeting was read and accepted.

The Secretary read the names of Fellows admitted since the last annual meeting, and of Fellows whose deaths had been reported.

Admissions reported since June 7, 1892.

1893	Achard, Hermann Jacoby	Manchester, N. H.
1893	Alexander, Clara Jane	Boston.
1893	Amadon, Arthur Frank	Melrose.
1892	Atwood, George Manley	Bradford.
1892	Baker, Frederick Herbert	Boston.
1892	Balcom, George Franklin	Worcester.
1892	Baldwin, Helen	Dakota.
1892	Barnes, Francis John	Cambridge.
1893	Bliss, William Howard	Three Rivers.
1893	Bossidy, John Collins	Boston.
1892	Bowman, Fred Raymond	Boston.
1893	Briggs, Charles Albert	Freetown.
1893	Broga, William Wallace	Springfield.

1893	Brough, David Dandie	Boston.
1893	Brown, Frank Byron	Dorchester.
1893	Bryant, Alice Gertrude	Boston.
1892	Cabot, Follen, Jr.	Brookline.
1892	Cabot, Richard Clarke	Boston.
1892	Carroll, John Aloysius	Worcester.
1893	Chase, Arthur Brown	Lynn.
1892	Clapp, Frank Horace	North Grafton.
1893	Clark, George Henry	Holyoke.
1892	Clark, Robert Anderson	Springfield.
1892	Coggeshall, Frederick	Boston.
1892	Cooper, Almon	Brookline.
1892	Cooper, Hermon	Amesbury.
1892	Councilman, William Thomas	Boston.
1892	Cousens, Nicholas William	Waltham.
1892	Craig, Daniel Hiram	Provincetown.
1891	Davis, Frederick Augustus	Boston.
1892	Day, Clarence Currier	Newburyport.
1892	Deal, Edward Edwin	East Boston.
1892	Deal, George Francis	East Boston.
1893	DeLue, Frederick Spaulding	Boston.
1892	Dole, Mary Phylinda	Greenfield.
1893	Dunbar, Frank Collins	Roxbury.
1893	Eddy, Mary Pierson	Beirut, Syria.
1892	Emerson, Herbert Clark	Boston.
1893	Ermentrout, Sallie Justina	Boston.
1893	Farish, James Collins	Lynn.
1893	Faulkner, Herbert Kimball	Keene, N. H.
1893	Fletcher, Robert Whitney	South Boston.
1893	Flynn, John Joseph	Pittsfield.
1892	Follett, Ammi Ward	Somerville.
1893	Ford, John Francis	Tewksbury.
1892	French, John Marshall	Milford.
1892	Frothingham, Richard	Boston.
1892	Fuller, James Robert	Boston.
1893	Gallivan, William Joseph	South Boston.
1892	Goodale, Joseph Lincoln	Boston.
1892	Goodwin, James Joseph	Clinton.
1893	Granger, Karle Henry	Randolph.
1893	Grouard, John Shackford	Nantucket.
1893	Hamilton, Erskine Erasmus	Springfield.
1892	Hardon, Robert Wallace	Boston.
1892	Harlow, George Arthur	Boston.
1892	Harwood, Charles Hamant	Boston.
1892	Howell, William Henry	Brookline.
1892	Ilsley, Frederick Roscoe	Dorchester.
1892	Jackson, Charles William	Monson.

1892	Jones, Lyman Asa	Worcester.
1893	Jordan, Charles Harold	Winchester.
1892	Keleher, Francis Joseph	Boston.
1892	Keleher, William Henry	Woburn.
1892	Kelsey, Otis Hiland	Springfield.
1892	Kirby, Nathaniel Harris	Concord.
1892	Knowlton, Herbert Eugene	Cambridgeport.
1892	Laforce, Edward Dontial	Farnumsville.
1892	Lancaster, Sherman Russell	Cambridge.
1892	Lawson, Frederick Bartlett	Boston.
1892	Leahey, George Henry Aloysius	Lowell.
1893	Littell, Alice	Brookline.
1893	Littlefield, Samuel Horace	Roxbury.
1892	Lyons, Christopher Philip	Boston.
1893	Manehan, Herbert Wellington	Lawrence.
1893	Mangan, John Joseph	Lynn.
1893	Mansfield, Robert Joseph	Springfield.
1892	Martin, John Joseph	Marblehead.
1893	McCalmont, Harriet Osborn	Franklin, Pa.
1862	McCarthy, Eugene Allan	Cambridgeport.
1892	McKentry, John Edmund	Waltham.
1892	McPherson, William Ellsworth	Charlestown.
1893	Merrick, Robert Michael	Boston.
1893	Miles, George Albert	West Somerville.
1892	Morrow, Charles Harvey	Gloucester.
1893	Mulcahy, Joseph Francis	Lowell.
1893	Murphy, John Henry	South Boston.
1893	Newcomb, Elizabeth	Tewksbury.
1892	Nichols, John Holyoke	Chelmsford.
1892	Nutter, William Dennett	Malden.
1893	O'Connor, James Bernard	Lowell.
1892	Ogden, Jay Bergen	Boston.
1893	O'Ready, James	Salem.
1892	Page, Hartstein Wendell	Worcester.
1892	Palmer, George Monroe	Boston.
1893	Parker, Wallace Asahel	North Adams.
1892	Pease, Edward Allen	Boston.
1892	Pero, Joseph Thomas	Indian Orchard.
1892	Peterson, Charles Augustus Barstow	New Bedford.
1892	Phelps, John Samuel	Boston.
1892	Phelps, Olney Winsor	West Warren.
1892	Porter, Charles Allen	Boston.
1892	Pratt, John Washburn	Boston.
1892	Quirk, Charles Hudson	Boston.
1892	Rand, John William	Amesbury.
1893	Rice, Frederick Winslow	Brookline.
1893	Rice, George LeRoy	North Adams.

1892	Ridlon, Chalmers Evans	Roxbury.
1892	Ruppel, Carl Emin Fraser	Lynn.
1893	St. Germain, Joseph Pierre	New Bedford.
1892	Sawin, Robert Valentine	Brimfield.
1893	Senay, Joseph	Salem.
1892	Sewell, John Jasper	Roxbury.
1893	Sheehan, William Joseph	Salem.
1893	Shurtleff, Frederick Cazeaux	Roxbury.
1893	Smith, Charles Morton	Boston.
1893	Spencer, George Albert	Ipswich.
1892	Stacey, Charles Franklin	Boston.
1893	Suter, William Norwood	Springfield.
1893	Sylvester, William Hillman	Natick.
1893	Taylor, George Lyman	Holyoke.
1892	Thayer, Eugene	Roxbury.
1893	Tierney, Edward Howran	Holyoke.
1892	Tilton, Frank Herbert	East Boston.
1892	Tingley, Herbert Black	Woodsburgh, N. Y.
1892	Tower, Frederick Russell	Boston.
1893	Troy, William	Lawrence.
1893	Trueman, Hermon Silas	Somerville.
1893	Valentine, Henry Charles	Lexington.
1892	Washburn, Elliott	Taunton.
1892	Webber, George Franklin	Waltham.
1892	White, Charles Warren	Fairhaven.
1892	Whiting, Geo. Washington Whitney	Somerville.
1892	Wilder, Raymond Sargent	Worcester.
1893	Wilson, Howard Eugene	Chester.
1893	Winslow, Edward Smith	Easthampton.
1892	Wynne, Sydney Yale	Boston.

Total, 137.

List of Deceased Fellows.

Admitted.	Name.	Residence.	Date of Death.	Age.
1835	Clark, Henry Grafton	Dorchester	Sep. 23, 1892	77
1856	Cowles, Henry	Saxonville	Oct. 8, 1892	77
1867	Doherty, Hugh	South Boston	July 31, 1892	49
1862	Dwight, William	North Amherst	Nov. 13, 1892	70
1851	Eastman, Edmund Tucker	Boston	Nov. 7, 1892	72
1869	Edgerly, David Mark	Cambridgeport	Dec. 20, 1892	53
1846	Edwards, Nathan Brown	No. Chelmsford	June 12, 1893	73
1841	Flint, Kendall	Haverhill	Sept. 28, 1892	85
1854	Hodgdon, Richard Lord	Arlington	Jan. 30, 1893	67
1880	Hodges, William Donnison	Nahant	March 6, 1893	37
1870	Hooker, John	Springfield	July 11, 1892	75
1876	Hooper, Franklin Henry	Boston	Nov. 22, 1892	42
1856	Jarvis, John Furness	Boston	Feb. 10, 1893	66
1838	Kimball, Gilman	Lowell	July 27, 1892	87
1851	Lester, William	South Hadley	Dec. 24, 1892	72

1864	Lincoln, William Henry	Millbury	Oct. 14, 1892	67
1887	Lunney, George	Malden	July 21, 1892	38
1845	Millet, Asa	East Bridgewater	March 21, 1893	80
1880	Mitivier, Moses Martin	Holyoke	July 15, 1892	58
1882	Nelson, Samuel Newell	Revere	Feb. 25, 1893	36
1843	Oliver, Fitch Edward	Boston	Dec. 8, 1892	73
1889	Pelton, Clarence Whitfield	Worcester	June 14, 1892	27
1884	Potter, Silas Allen	Roxbury	July 10, 1892	38
1858	Sargent, George Woodbury	Lawrence	Jan. 1, 1893	59
1842	Scammell, Lucius Leslie	St. Louis, Mo.	Feb. 13, 1892	72
1836	Shattuck, George Cheyne	Boston	March 22, 1893	79
1852	Shaw, Benjamin Shurtleff	Boston	May 2, 1893	65
1866	Snow, George Williams	Newburyport	May 20, 1893	55
1880	Strong, Charles Pratt	Boston	March 14, 1893	37
1873	Tourtelot, John Quincy Adams	Fall River	Oct. 25, 1892	50
1862	Tower, Charles Carroll	So. Weymouth	May 29, 1893	59
1868	Weeks, Albert Poland	Chelsea	April 7, 1893	54
1843	Weld, Moses Williams	Boston	Jan. 16, 1893	75
1837	Wheatland, Henry	Salem	Feb. 27, 1893	81
1853	Young, Samuel Lane	Ferry Village, Me	April 19, 1893	80

Total, 35.

The Treasurer, Dr. Forster, presented his annual report.

The Committee appointed at the last annual meeting to report upon the classification and nomenclature employed in the Vital Statistics of Massachusetts requested further time, which was granted.

Papers were read as follows:

A Consideration of Erysipelas occurring during the Puerperium.—By Dr. C. W. Galloupe, of Boston.

A Demonstration of Modern Methods and Instruments in Genito-Urinary Surgery.—By Dr. Paul Thorndike, of Boston. Dr. F. S. Watson made remarks upon this paper.

Diphtheria and other Membranous Affections of the Throat.—By Dr. F. H. Williams, of Boston. Discussion by Dr. W. T. Councilman, of Boston.

The following delegates from other State Medical Societies were present:

Maine.—Drs. C. A. Peaslee, F. E. Hitchcock.
New Hampshire.—Dr. S. W. Roberts.
Rhode Island.—Dr. H. G. MacKaye.
Connecticut.—Dr. E. P. Flint.
New York.—Dr. McL. Winfield.
New Jersey.—Dr. S. E. Armstrong.

At 12 o'clock the Annual Discourse was delivered by Dr. J. T. G. NICHOLS, of Cambridge.

Voted,—That the thanks of the Society be presented to Dr. Nichols for his interesting, thoughtful and able address.

At 1, P.M., the Annual Dinner, presided over by the Anniversary Chairman, Dr. GEORGE W. GAY, was served to more than seven hundred Fellows and invited guests.

FRANCIS W. GOSS,
Recording Secretary.

TREASURER'S REPORT.

THE Treasurer presents the following report for the year ending 15 April, 1893.

The invested funds are as follows:

The Permanent Fund	$11,253 30
The Shattuck Fund	9,166 87
The Phillips Fund	10,000 00
The Cotting Fund	3,000 00
	$33,420 17

The balance on hand of cash at the beginning of the year was	$1,861 65
The Receipts have been:—	
Assessments paid direct to the Treasurer	1,286 00
Assessments paid to District Treasurers:	
Barnstable	$95 00
Berkshire	135 00
Bristol North	115 00
Bristol South	295 00
Essex North	380 00
Essex South	460 00
Franklin	135 00
Hampden	350 00
Hampshire	195 00
Middlesex East	160 00
Middlesex North	445 00

Middlesex South	930 00	
Norfolk	835 00	
Norfolk South	220 00	
Plymouth	160 00	
Suffolk	1,845 00	
Worcester	590 00	
Worcester North	190 00	
		7,435 00
Income :		
Permanent Fund	450 12	
Shattuck Fund	366 67	
Phillips Fund	400 00	
Cotting Fund	122 20	
Interest on cash balance	48 56	
		1,387 55
Sale of extra dinner tickets		6 00
Making a total of		$11,976 20

The Expenses have been :—

The Annual Meeting and Dinner :		
Advertising	$1 50	
Rent of hall	375 00	
Signs and badges	9 00	
Ticket takers, police, janitor, ice, etc.	25 25	
Printing, postage, and stationery	34 12	
Stenographers	42 00	
Flowers	90 00	
Music	104 00	
Caterer	1,750 00	
Cigars	117 75	
		$2,548 62
Salaries in full to 15 April, 1893		1,050 00
Treasurer's expense :		
Printing, postage and stationery		159 75
Recording Secretary's expense :		
Printing, postage and stationery		114 60
Librarian's expense :		
Printing, postage and stationery and express		360 70
District Treasurers' expense :		
Commissions and incidentals		421 99
Censors' expense :		
Fees, advertising and stationery		467 05
Committee on Publications :		
Braithwaite's Retrospect	$2,099 75	
Communications and Transactions	833 46	
The Shattuck Lecturer	200 00	
Printing, postage and stationery	3 25	
		3,136 46

The Cotting Lunch for Councillors	121 39
Annual Rent	150 00
Dividend distributed to the District Societies	1,405 12
Sundry incidental expenses	4 11
Making the total expenses,	$9,939 79
Leaving a balance on hand of	$2,036 41

This balance is distributed as follows :

Unexpended income of Shattuck Fund	$181 82
Unexpended income of Cotting Fund	84 41
Unexpended general income	1,770 18
	$2,036 41

TRIAL BALANCE—15 April, 1893.

Dr.		Cr.	
Cash	$2,036 41	Property	$33,420 17
Permanent Fund Investment	11,253 30	Permanent Fund	11,253 30
Shattuck Fund Investment	9,166 87	Shattuck Fund	9,166 87
Cotting Fund Investment	3,000 00	Cotting Fund	3,000 00
Phillips Fund Investment	10,000 00	Phillips Fund	10,000 00
Mass. Hosp. Life Ins. Co.	20,420 17	Shattuck Fund Income	181 82
Provident Ins. Savings	1,000 00	Cotting Fund Income	84 41
Suffolk Savings Bank	1,000 00	Profit and loss	1,770 18
Roxbury Ins. for Savings	1,000 00		
U. S. 4% Bonds	10,000 00		
	$68,876 75		$68,876 75

All of which is respectfully submitted.

EDWARD JACOB FORSTER,

BOSTON, 13 JUNE, 1893. *Treasurer.*

BOSTON, 17 MAY, 1893.

The undersigned, a duly appointed Auditing Committee, having examined the books of the Treasurer, find them correctly cast and properly vouched; and also find that he has in his possession the various securities and funds called for.

E. PEABODY GERRY,
GEORGE G. TARBELL, } *Committee.*

Officers of the Massachusetts Medical Society.

1893—1894.

Chosen June 13, 1893.

JAMES C. WHITE, . . Boston, . . President.
ZABDIEL B. ADAMS, . Framingham, Vice-President.
EDWARD J. FORSTER, Boston, . . Treasurer.
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FRANCIS W. GOSS, . . Roxbury, . Rec. Secretary.
EDWIN H. BRIGHAM, . Boston, . . Librarian.
REGINALD H. FITZ, . Boston, . . Orator.
SILAS D. PRESBREY, . Taunton, . Anniv. Chairman.

Standing Committees.

Of Arrangements.

F. M. Briggs, J. C. Munro, A. K. Stone,
H. Jackson, A. Thorndike, J. G. Mumford.

On Publications.

B. E. Cotting, O. F. Wadsworth, G. B. Shattuck.

On Membership and Finances.

F. W. Draper, J. Stedman, E. G. Cutler,
L. R. Stone, A. H. Johnson.

To Procure Scientific Papers.

H. P. Walcott, H. L. Burrell, L. Wheeler,
F. H. Zabriskie, S. W. Woodward, C. W. Townsend.

On Ethics and Discipline.

G. J. Townsend, G. E. Francis, F. C. Shattuck,
C. G. Carleton, E. Cowles.

On Medical Diplomas.

E. J. Forster, H. E. Marion, E. N. Whittier.

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(Arranged according to Seniority.)

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F. C. Plunkett,
F. W. Brigham,
C. E. Vaughan,
H. A. Dean,
J. R. Greenleaf,
C. C. Odlin,
J. W. Spooner,
A. L. Mason,
C. P. Morrill,
E. A. Chase,
T. Kittredge,
G. C. McClean,
J. H. Jackson,
E. F. Galligan,
G. P. Twitchell,
R. H. Faunce,
L. D. Woodbridge.

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WORCESTER NORTH.—Drs. E. L. Fiske, Fitchburg; J. G. Henry, Winchendon; A. P. Mason, C. W. Spring, J. W. Stimson, Fitchburg.

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Massachusetts Medical Society.

PROCEEDINGS OF THE COUNCILLORS.

October 4, 1893.

A Stated Meeting of the Councillors was held in the hall of the Medical Library Association, No. 19 Boylston Place, Boston, on Wednesday, October 4, 1893, at 11 o'clock, A.M.

The President, Dr. James C. White, in the chair.

The following Councillors were present:

Berkshire.
J. F. A. Adams.

Bristol North.
S. D. Presbrey.

Bristol South.
W. A. Dolan,
G. DeN. Hough.

Essex North.
B. W. Bartlett,
M. D. Clarke.

Essex South.
A. H. Johnson,
E. A. Kemp,
G. A. Stickney.

Hampden.
W. H. Pomeroy.

Middlesex East.
S. W. Abbott,
S. W. Kelley.

Middlesex North.
H. R. Brissett,
H. B. Howard,
W. B. Jackson,
W. J. Sleeper,
J. B. Wentworth.

Middlesex South.
E. R. Cutler,
C. K. Cutter,
T. M. Durell,
A. G. Griffin,
J. L. Harriman,
E. G. Hoitt,
J. A. Mead,
J. T. G. Nichols,
L. R. Stone,
J. L. Sullivan,
J. W. Willis,
A. Worcester,
M. Wyman.

Norfolk.
A. W. Blair,
W. Channing,
A. B. Coffin,
S. M. Crawford,
A. H. Hodgdon,
A. R. Holmes,
A. P. Perry,
M. V. Pierce,
L. H. Plimpton,
O. F. Rogers,
I. W. Starbird,
C. E. Stedman,
J. Stedman.

Norfolk South.
T. H. Dearing,
J. F. Welch.

Plymouth.
H. F. Borden,
B. F. Hastings,
F. G. Wheatley.

Suffolk.
S. L. Abbot,
J. B. Ayer,
H. J. Barnes,
A. N. Blodgett,
E. H. Brigham,
F. H. Brown,
F. E. Bundy,
J. F. Bush,
D. W. Cheever,
J. W. Cushing,
E. G. Cutler,
F. W. Draper,
T. W. Fisher,
R. H. Fitz,
E. J. Forster,
G. M. Garland,
M. F. Gavin,
W. H. H. Hastings,
J. Homans,
B. J. Jeffries,
F. I. Knight,
A. L. Mason,
J. H. McCollom,
F. Minot,
C. B. Porter,
A. Post,
J. M. Putnam,
W. L. Richardson,
T. M. Rotch,
F. C. Shattuck,
C. W. Swan,
G. G. Tarbell,
J. C. White,
W. F. Whitney,
H. W. Williams.

Worcester.
M. Bemis,
G. E. Francis,
E. B. Harvey,
J. O. Marble,
G. C. Webber.

Worcester North.
L. W. Baker,
F. H. Thompson.

Total, 90.

The record of the previous meeting was read and accepted.

The following were appointed Delegates to other State Medical Societies:

Vermont.—Drs. W. S. Birge, of Provincetown; O. J. Brown, of North Adams.

New York.—Drs. W. H. Pierce, of Greenfield; C. F. Withington, of Roxbury.

New York State Medical Association.—Drs. J. M. Harlow, of Woburn; G. B. Shattuck, of Boston.

The Committee on Membership and Finances reported through Dr. Draper.

In accordance with their recommendation, it was voted that the following become retired members:

Charles Bowker, of Bernardston.
Marshall Calkins, of Springfield.
J. W. Hartley, of Fall River.

Also, that the following be allowed to resign:

G. H. Tilden, of Boston.

Also that the following be dropped for five years' delinquency in assessments:

Warren Pierce, of Plymouth.

On recommendation of the Committee on Publications it was

Voted, That the subscription to and distribution of *Braithwaite's Retrospect* be discontinued as soon as practicable, and that the Librarian take the necessary steps to carry out this vote.

Voted, That Justin Gideon Hayes, of Williamsburg, be restored to membership in the Society.

Adjourned at 12.05 P.M.

FRANCIS W. GOSS,
Recording Secretary.

FEBRUARY 7, 1894.

A STATED MEETING of the Councillors was held in the hall of the Medical Library Association, No. 19 Boylston Place, Boston, on Wednesday, February 7, 1894, at 11 o'clock, A.M.

The President, Dr. JAMES C. WHITE, in the chair.

The following Councillors were present:

Berkshire.
O. J. Brown.

Bristol North.
F. A. Hubbard,
S. D. Presbrey.

Bristol South.
W. A. Dolan.

Essex North.
B. W. Bartlett,
M. D. Clarke,
G. C. Howard,
H. G. Leslie.

Essex South.
W. W. Eaton,
A. H. Johnson,
E. A. Kemp,
G. A. Stickney,
S. W. Torrey.

Middlesex East.
S. W. Abbott,
J. S. Clark.

Middlesex North.
H. R. Brissett,
H. B. Howard,
W. B. Jackson,
W. J. Sleeper,
C. P. Spalding,
J. B. Wentworth.

Middlesex South.
Z. B. Adams,
W. H. Baker,

W. A. Bell,
E. Cowles,
E. R. Cutler,
C. K. Cutter,
S. W. Driver,
T. M. Durell,
E. G. Hoitt,
J. T. G. Nichols,
G. A. Oviatt,
E. H. Stevens,
L. R. Stone,
J. L. Sullivan,
G. E. Titcomb,
C. E. Vaughan,
H. P. Walcott,
J. W. Willis,
M. Wyman.

Norfolk.

E. H. Baxter,
A. W. Blair,
W. Channing,
A. B. Coffin,
S. M. Crawford,
E. C. Norton,
A. P. Perry,
M. V. Pierce,
O. F. Rogers,
C. E. Stedman,
G. B. Stevens,
C. R. Whitcombe,
H. W. White.

Norfolk South.

T. H. Dearing.

Plymouth.

W. G. Brown,
H. W. Dudley,
B. F. Hastings,
F. G. Wheatley.

Suffolk.

J. B. Ayer,
E. H. Brigham,
F. H. Brown,
F. E. Bundy,
H. L. Burrell,
J. F. Bush,
B. F. Campbell,
J. R. Chadwick,
D. W. Cheever,
J. W. Cushing,
E. G. Cutler,
F. W. Draper,
T. W. Fisher,
E. J. Forster,
M. F. Gavin,
C. M. Green,
W. H. H. Hastings,
W. C. Holyoke,
W. Ingalls,
B. J. Jeffries,
F. I. Knight,
A. L. Mason,
J. H. McCollom,
F. Minot,
A. B. Morong,
A. H. Nichols,
C. B. Porter,
A. Post,
J. M. Putnam,
W. L. Richardson,
T. M. Rotch,
F. C. Shattuck,
G. B. Shattuck,
A. D. Sinclair,
A. M. Sumner,
C. W. Swan,
G. G. Tarbell,
J. C. White,
W. F. Whitney,
H. W. Williams.

Worcester.

W. Davis,
G. E. Francis,
E. B. Harvey,
S. P. Holbrook,
J. O. Marble,
G. C. Webber,
E. R. Wheeler,
L. Wheeler.

Worcester North.

L. W. Baker,
L. G. Chandler,
F. H. Thompson.

Total, 109.

The record of the last meeting was read and accepted.

The following were appointed Delegates to other State Medical Societies:

Maine.—Drs. J. E. Garland, of Gloucester; M. H. Richardson, of Boston.

New Hampshire.—Drs. J. G. Blake, of Boston; C. C. Odlin, of Melrose.

Rhode Island.—Drs. F. W. Goss, of Roxbury; R. H. Faunce, of Sandwich.

Connecticut.—Drs. G. E. Francis, of Worcester; C. H. Cook, of Natick.

New Jersey.—Drs. C. A. Carlton, of Salem; H. Colt, of Pittsfield.

The following Committees were appointed:

To Audit the Treasurer's Accounts.—Drs. G. G. Tarbell, A. D. Sinclair.

To Examine the By-Laws of District Societies.—Drs. S. D. Presbrey, F. W. Chapin, H. J. Barnes.

The Committee on Membership and Finances reported through Dr. Draper. In accordance with their recommendation it was voted that the following be allowed to resign:

G. S. Dodge, of Woods Holl.
J. W. Grady, of New York.
Helen Baldwin, of Baltimore, Md.
B. A. Abbè, of Hartford, Conn.
W. H. Howell, of Baltimore, Md.
H. H. Luce, of Laurel, Del.

Also, that the following be allowed to retire:

A. C. Deane, of Greenfield.
Henry Russell, of Sandwich.

Also, that the following, owing assessments for more than five consecutive years, be dropped from the Roll of Fellows:

F. S. Abbott, of Des Moines, Iowa.
John Baker, of Salisbury, N. H.
P. R. Boutelle, of Essex.
Samuel Camp, of Great Barrington.
W. F. Channing, of Pasadena, Cal.
Noah Cressy, of Hartford, Conn.
J. W. Crow, of England.
S. F. Dickinson, of Pittsfield.
Moses Fifield, of Centralville, R. I.
Luther Johnson, of Boston.
William Lyman.
Bradley Noyes, of Beaver Dam, Wis.

L. H. Pease, of Thomsonville, Conn.
John Plant, of Northbridge.
B. T. Prescott, of Boston.
Abner Sears.
J. T. Skinner, of Springfield.
M. A. Tucker, of Pittsfield.

The Committee on securing uniformity in Censors' examinations reported as follows: —

At a meeting of the Councillors, held October 2, 1893, the report of the Committee on securing Uniformity in Censors' Examinations was presented. To it objection was raised that it might exceed the limitations of the charter. The subject was thereupon referred to a new Committee, to be appointed by the Chair, and to include the President himself. The Committee thus appointed consists of one member from each District Society.

Your Committee has carefully considered many plans for the establishment of a uniform examination of candidates for admission to this Society. The present status for admission is somewhat as follows: Different standards are established by eighteen different Boards of Censors, not acting in concert, and having only in common the welfare of the Society. The objections to this plan are the following:

(1) That in certain Districts a comparatively severe examination is held for admission to the Society; that in other Districts a comparatively easy examination is held.

(2) That the Boards of Censors, as a rule, are composed of young men but a few years out from the Medical School, who are naturally sharper critics than the older Fellows of the Society.

(3) That at present the Boards of Censors know very little of the requirements for admission into other State Societies.

(4) That there are many excellent regular practitioners scattered throughout the State, and that their number of late has been increasing, who are not members of the Society. This is owing to failure on their part to present themselves for admission to the Society, and this failure is due to their wishing to avoid the rigor of an examination conducted by young men; in many instances by rival practitioners.

We believe that it will be for the interest of the Society to establish a uniform standard of examinations throughout the Commonwealth, and further that such examinations shall be elastic at the discretion of the Censors, in order that practitioners of established reputation shall not be hindered from entering the Society.

In order to accomplish this object your Committee respectfully suggests that the Councillors and the Society authorize the following changes in the By-Laws.

(1) By-Law I to be changed by striking out part of line 21 on page 9, and lines 22 to 26 inclusive, and substituting the following words, so that the By-Law shall read, "and by such further examination as the Censors shall deem expedient."

(2) By-Law XIII to be changed by omitting the words "five Censors," in line 22, and adding in line 23 the words "five Censors, all of whom shall have been Fellows of the State Society for at least ten years, one of whom shall be also a Councillor, and be designated a Supervisor, and Ex-Officio Chairman of the Board of Censors."

(3) By-Law XIX to be changed by adding after the word "held," in line 19, the words "they shall appoint the time and place of the annual meeting of the Supervisors."

(4) After the title "Censors," commence By-Law XX with the following additional provisions relating to supervisors:

The Censors, elected Supervisors, shall form a Board.

They shall elect their own chairman.

The Recording Secretary of the State Society shall be their Secretary.

For the transaction of business ten Supervisors shall constitute a quorum.

They shall hold an annual meeting at such time and place as the Council shall direct; and may hold other meetings at such places and times as they may agree to appoint.

At their annual meeting, or adjournments thereof, the Supervisors shall formulate and adopt a uniform plan, consistent with the requirements of the By-Laws, to be pursued the ensuing year, by each District Board of Censors, in the examination of candidates.

They may authorize the Secretary to have printed, at the expense of the Society, all blanks and examination papers necessary to carry out their plans.

The Secretary shall furnish examination papers to Supervisors only, and in such number as each may, in writing, request.

It shall be the duty of each Supervisor to convey to the Board of Censors of the District Society to which he belongs, together with the necessary examination papers, a report of the method and spirit in which the Board of Supervisors have directed that their plan should be used, and to see that in all examinations the designated details are properly executed.

Should a candidate otherwise qualified, but without a diploma from one of the schools accredited by this Society, satisfy the Censors of the District Society where he resides, by examination,

that he has received an education equivalent to that prescribed by the By-Laws of this Society, the Supervisor of said District Society shall present the name, standing and qualifications of said candidate, to the full Board of Supervisors at their next meeting, whereupon the assenting votes of two-thirds of the Supervisors present and voting, shall elect such a candidate to be a Fellow of this Society.

(5) By-Law XX to be changed by adding after the word "By-Laws" in line 2, the following, so that the By-Law shall read: "The Censors shall examine, according to the rules and By-Laws, and in conformity with the directions of the Supervisors," such candidates, etc.; also after the word "day," in line 21, by adding the following, "but not at the same hour or hours."

(6) By-Law XXI to be changed by substituting the word "supervising," for the word "senior," so that this By-law shall read, "and the supervising Censor shall preside."

Dr. J. C. White, *President.*

Dr. G. W. Doane,	Dr. J. F. A. Adams,
Dr. F. A. Hubbard,	Dr. B. J. Handy,
Dr. R. B. Root,	Dr. A. H. Johnson,
Dr. A. C. Deane,	Dr. W. H. Pomeroy,
Dr. D. W. Miner,	Dr. S. W. Kelley,
Dr. H. B. Howard,	Dr. E. R. Cutler,
Dr. M. V. Pierce,	Dr. J. F. Welch,
Dr. H. F. Borden,	Dr. J. F. McCollom,
Dr. E. B. Harvey,	Dr. F. H. Thompson,

Committee.

In offering the report, the President made remarks in support of the statements in the preamble, and was followed in discussion by Drs. Harvey, Williams, Wheeler, Francis, F. C. Shattuck and Cutler, after which it was

Voted, That the report be accepted and that the changes in the By-Laws, as far as the Council is concerned, be adopted.

The Librarian, Dr. Brigham, reported that in accordance with the vote at the last meeting the publishers were notified that no orders for future numbers of Braithwaite's Retrospect would be given. An acknowledgment was received from them, thanking the Society for such timely notice of the vote.

The Treasurer, Dr. Forster, offered the following, which were adopted:

Voted,—That the Librarian shall be the Custodian of such papers, manuscripts and books of record belonging to the Society as are not in use by its Officers. He shall properly catalogue them, and see that they are stored against the risk of fire. He shall arrange and file them in such a manner as to promote the convenience of Fellows of the Society who may desire to consult them. He shall include in his annual statement a report upon their condition.

Voted,—That a Committee of three be appointed by the President, with instructions and authority to examine all papers, manuscripts and documents belonging to the Society now stored in the building of the Boston Medical Library Association, and deliver to the Librarian such as they consider should be filed.

The Committee is authorized to destroy such of the remaining documents, receipted and outlawed bills, routine reports and the like, as in their unanimous opinion are not of present or probable prospective value to the Society.

The Committee is directed to report its action at the next meeting of the Council.

Drs. Forster, Draper and F. H. Brown were appointed as the Committee.

Voted,—That as the Censors are Officers acting for the State Society, the different Boards of Censors are hereby directed to forward to the Librarian of the State Society such books of record as are not in present use.

Voted,—That the edition of the catalogue now being printed be three thousand copies. That a copy be sent to each active member and to such retired and honorary members as may apply for one. That the Librarian put aside one hundred and fifty copies for the usual exchanges, and fifty copies for the use of the Officers. That the charge for extra copies be fifty cents.

Voted, That the following rule of the Rules and Orders of the Councillors be anulled:

2. There may also be annually prepared, under the direction of the Councillors and at the expense of the Society, a Retrospect of the Medical Literature and Science of the preceding year, having reference especially to discoveries and improvements of practical value.

Adjourned at 1 P.M.

FRANCIS W. GOSS,

Recording Secretary.

June 12, 1894.

The Annual Meeting of the Councillors was held in the hall of the Medical Library Association, No. 19 Boylston Place, Boston, on Tuesday, June 12, 1894, at 11 o'clock, A.M.

The President, Dr. James C. White, in the chair.

The following Councillors were present:

Barnstable.
B. D. Gifford,
E. E. Hawes.

Berkshire.
J. F. A. Adams,
O. J. Brown,
F. K. Paddock,
W. W. Scofield,
L. D. Woodbridge.

Bristol North.
H. B. Baker,
F. A. Hubbard,
S. D. Presbrey,
W. S. Robinson.

Bristol South.
W. A. Dolan,
G. DeN. Hough,
W. T. Learned.

Essex North.
B. W. Bartlett,
H. J. Cushing,
E. P. Hurd,
C. P. Morrill.

Essex South.
J. Allen,
H. K. Foster,
C. W. Haddock,
W. E. Holbrook,
C. E. Jenkins,
A. H. Johnson,
G. N. Jones,
C. E. Meader,
J. G. Pinkham,
J. Shanahan.

Franklin.
A. C. Walker.

Hampden.
D. J. Brown,
U. H. Flagg,
G. E. Fuller,
W. Holbrook,
J. W. Hannum,
J. C. Hubbard,
G. F. Shurtleff.

Middlesex East.
S. W. Abbott,
J. S. Clark,
J. M. Harlow,
S. W. Kelley.

Middlesex North.
F. W. Chadbourne,
C. M. Fisk,
H. B. Howard,
W. B. Jackson,
W. J. Sleeper,
C. P. Spalding,
J. B. Wentworth.

Middlesex South.
Z. B. Adams,
W. A. Bell,
R. A. Blood,
J. F. Couch,
E. Cowles,
E. R. Cutler,
T. M. Durell,
W. Ela,
J. F. Frisbie,
J. L. Harriman,
E. G. Hoitt,
R. P. Loring,
H. E. Marion,
H. B. McIntire,
J. T. G. Nichols,
E. H. Stevens,
L. R. Stone,
J. L. Sullivan,
J. O. Tilton,
G. J. Townsend,
C. E. Vaughan,
J. W. Willis,
A. Worcester.

Norfolk.
E. H. Baxter,
A. W. Blair,
A. B. Coffin,
S. M. Crawford,
S. Crowell,
G. H. Francis,
J. S. Greene,
A. R. Holmes,
W. B. Lancaster,
J. P. Maynard,
A. P. Perry,
L. H. Plimpton,

O. F. Rogers,
J. Stedman,
G. B. Stevens,
C. R. Whitcombe,
J. A. Winkler,
H. W. White.

Norfolk South.

T. H. Dearing,
E. N. Mayberry,
J. F. Welch.

Plymouth.

H. W. Dudley,
B. F. Hastings,
A. E. Paine,
F. G. Wheatley.

Suffolk.

S. L. Abbot,
J. B. Ayer,
A. N. Blodgett,
E. H. Brigham,
F. H. Brown,
E. M. Buckingham,
F. E. Bundy,
J. F. Bush,
B. F. Campbell,
J. R. Chadwick,
D. W. Cheever,
E. G. Cutler,
F. H. Davenport,
F. W. Draper,
R. D. Elliott,
R. H. Fitz,
C. F. Folsom,
E. J. Forster,
M. F. Gavin,
G. W. Gay,
C. M. Green,
W. H. H. Hastings,
W. C. Holyoke,
W. Ingalls,
B. J. Jeffries,
F. I. Knight,
A. L. Mason,
F. Minot,
J. J. Minot,
A. B. Morong,
C. B. Porter,
J. M. Putnam,
W. L. Richardson,
T. M. Rotch,
F. C. Shattuck,
G. B. Shattuck,
A. D. Sinclair,
A. M. Sumner,
C. W. Swan,
G. G. Tarbell,
O. F. Wadsworth,
J. C. Warren,
J. C. White,
W. F. Whitney,
E. N. Whittier,
H. W. Williams.

Worcester.

M. Bemis,
A. G. Blodgett,
P. P. Comey,
W. Davis,
T. H. Gage,
E. B. Harvey,
J. W. Hastings,
S. P. Holbrook,
J. O. Marble.

Worcester North.

R. F. Andrews,
E. J. Cutter,
L. G. Chandler,
J. W. Stimson,
F. H. Thompson.

Total, 155.

The record of the previous meeting was read and accepted.

The Secretary read the names of new and of deceased Fellows.

The Treasurer, Dr. Forster, read his annual report.

The Auditing Committee reported that they found the Treasurer's accounts correctly cast and properly vouched, and that he has in his possession the various securities and funds called for.

The Treasurer's report was then accepted.

The Committee on Membership and Finances reported through Dr. Draper and recommended that $1900.00 of the

surplus in the treasury be distributed among the District Societies.

The recommendation of the Committee was adopted.

On recommendation of the same Committee it was voted that the following be allowed to retire:

J. R. Bronson, of Attleboro'.
S. F. Pomeroy, of Springfield.
D. W. Jones, of Boston.
H. S. Soulé, of Winthrop.

Also, that the following be allowed to resign:

C. K. Burr, of San José, Cal.
A. W. Clark, of Lawrence, Kansas.
F. S. Coolidge, of Chicago, Ill.
R. W. Hardon, of Chicago, Ill.
Kate C. Mead, of Middletown, Conn.
F. R. Starr, of Oakland, Cal.
Grace A. Preston, of Colorado Springs, Col.
J. B. Heald, of Drain, Oregon.

Also, that the following be dropped for five years' delinquency of assessments:

C. A. Burnham, of Boston.
H. H. Flagg, of Northampton.
John Gillespie, of Roxbury.
D. S. Harkins, of Dorchester.

The Committee on Publications presented their report.

The Librarian, Dr. Brigham, presented his report.

Voted, That the following be restored to membership in the Society:

Henry Smith Babbitt, of Dorchester, and retired.
John Atwood Follett, of Boston.
Ellery Cola Hebbard, of Boston.
John Clifford Lincoln, of Hyde Park.
Eugene Potter Stone, U. S. Navy.
William Henry Thayer, of Berkshire.
Charles Augustus Wheeler, of Leominster.

Dr. Forster, for the Committee appointed at the last meeting to examine papers, manuscripts, etc., belonging

to the Society, presented a report of their action in accordance with instructions.

The Committee on Nominations reported a list of candidates for the offices of the Society for the ensuing year, and the same were elected by ballot:

President . .	Dr. Franklin K. Paddock, of Pittsfield.
Vice-President .	Dr. Frederic A. Sawyer, of Wareham.
Treasurer . .	Dr. Edward J. Forster, of Boston.
Corresponding Sec'y	Dr. Charles W. Swan, of Boston.
Recording Secretary	Dr. Francis W. Goss, of Roxbury.
Librarian . .	Dr. Edwin H. Brigham, of Boston.

Dr. Alfred Worcester, of Waltham, was chosen Orator, and

Dr. Herbert L. Burrell, of Boston, Anniversary Chairman, for the Annual Meeting of the Society in 1895.

Voted, That the next Annual Meeting of the Society be held in Boston, on the second Wednesday in June, 1895.

On nomination by the President, the following Standing Committees were appointed:

Of Arrangements.

H. Jackson, A. Thorndike, J. G. Mumford,
J. C Munro, A. K. Stone, M. V. Pierce.

On Publications.

B. E. Cotting, O. F. Wadsworth, G. B. Shattuck.

On Membership and Finances.

F. W. Draper, J. Stedman, E. G. Cutler,
L. R. Stone, A. H. Johnson.

To Procure Scientific Papers.

H. P. Bowditch, H. L. Burrell, L. Wheeler,
F. H. Zabriskie, S. B. Woodward, C. W. Townsend.

On Ethics and Discipline.

G. E. Francis, F. C. Shattuck, C. G. Carleton,
E. Cowles, J. F. A. Adams.

On Medical Diplomas.

E. J. Forster, H. E. Marion, E. N. Whittier.

On motion of Dr. C. M. Green,

Voted, That the rule by which the Obstetrical Section was established be rescinded, and that the Section be abolished.

Dr. Shattuck offered the following, which was adopted:

That Section 7 of the Rules and Orders of the Council be amended by the addition of the words: "A Standing Committee on State and National Legislation."

This committee shall consist of five members, including the President *ex-officio*.

It shall be the duty of this Committee to take such action in reference to proposed legislation as shall, in their opinion, be most conducive to the interests of the medical profession, and make an annual report therein.

Voted, On motion of Dr. Gage, that the Committee of Arrangements for the Anniversary shall hereafter consist in part of members of the Council.

Dr. J. F. A. Adams presented the following, which was passed:

Resolved, That in the opinion of the Council it is advisable that District Societies shall include in their election to this body such ex-Presidents of the State Society as may reside therein.

Dr. Cheever presented the following, which was adopted:

Whereas, It is more consistent with the dignity of the office, and in conformity with the custom of all societies of such high character, that the President should preside over all meetings, and especially at the most important public occasion, the annual dinner;

Resolved, That By-Law XIX. of the Society be amended by omitting the words: "and an Anniversary Chairman, whose duty it shall be to act as Chairman of the Committee of Arrangements and to preside at the annual dinner for said year;" and by the omission of the words: "the Anniversary Chairman, or of" in the second paragraph of the same By-Law.

The President introduced the President-elect, Dr. F. K. Paddock, who made a brief and fitting response.

Adjourned at 1.15 P.M.

FRANCIS W. GOSS,

Recording Secretary.

Massachusetts Medical Society.

PROCEEDINGS OF THE SOCIETY.

ANNUAL MEETING.

First Day.

Sectional meetings of the Society were held at the Harvard Medical School, Boston, on Tuesday, June 12, 1894, at 2 o'clock, P.M.

The sections were organized and papers were presented as follows:

SECTION IN MEDICINE.

Dr. F. C. Shattuck, of Boston . . . . Chairman.
Dr. G. G. Sears, of Boston . . . . . Secretary.

The Protective Power of Vaccination.—By Dr. J. H. McCollom, of Boston.

The Technique of Vaccination.—By Dr. W. N. Swift, of New Bedford.

Radical Differences in Methods of Cultivation of Vaccine Lymph.—By Dr. S. W. Abbott, of Wakefield.

Discussion by Drs. J. F. A. Adams, of Pittsfield; L. F. Woodward, of Worcester; J. B. Field, of Lowell; F. C. Martin, of Roxbury; F. E. Corey, of Westboro'; Z. B. Adams, of Framingham; W. Davis, of Worcester.

SECTION IN SURGERY.

Dr. F. K. Paddock, of Pittsfield . . . . Chairman.
Dr. C. L. Scudder, of Boston . . . . Secretary.

THE CURE OF CARCINOMA OF THE BREAST BY OPERATION.—By Dr. W. T. Bull, of New York City.

Discussion by Drs. D. W. Cheever, J. C. Warren, G. W. Gay, M. H. Richardson, of Boston; T. F. Breck, of Springfield; S. H. Weeks, F. H. Gerrish, of Portland, Me.; J. B. Wheeler, of Burlington, Vt.

At 8 o'clock, P.M., the Shattuck Lecture was given by Dr. THOMAS DWIGHT, of Nahant.

FRANCIS W. GOSS,
Recording Secretary.

SECOND DAY.

THE Society met in Mechanic Building, Boston, on Wednesday, June 13, 1894, at 9 o'clock, A.M., for the exercises of the one hundred and thirteenth Anniversary.

The President, Dr. JAMES C. WHITE, in the chair.

The record of the last annual meeting was read and accepted.

The Secretary read the names of Fellows admitted since the last annual meeting, and of Fellows whose deaths had been reported.

Admissions reported since June 13, 1893.

1894	Abbott, Howard Edwin	Lynn.
1894	Adams, Charles Eli	Taunton.
1894	Adams, Wendell Holmes	Kingston.
1894	Atkinson, Lizzie Daniel Rose	Boston.
1893	Bailey, George Guy	Rowley.
1894	Ball, Charles Dickens Evans	Boston.
1893	Bemis, John Merrick	Worcester.
1894	Billings, William Chester	Boston.
1894	Blake, Warren Perkins	Springfield.
1894	Bowen, Henry Charles	Springfield.
1893	Brett, Frank Wallace	Braintree.
1893	Brewster, George Washington Wales	Boston.

1894	Brown, Daniel Joseph	Springfield.
1893	Bryson, Adelbert Allen	Fall River.
1893	Buck, Augustus Walker	Fall River.
1894	Burleigh, Charles	Malden.
1893	Burrell, Benjamin Henry	Roxbury.
1894	Cain, Willie George	Cambridge.
1893	Carr, Frank Fletcher	Cambridgeport.
1894	Chapman, Frank Bowditch	Middleton.
1893	Chase, Richard Fitch	Boston.
1894	Chisholm, William James	Springfield.
1893	Clark, Joseph Eddy	Medford.
1893	Cobb, Farrar Crane	Boston.
1893	Cody, Edmond Francis	Rochester, N. Y.
1893	Conlon, Andrew Aloysius	Worcester.
1893	Coolidge, John Nelson	Leicester.
1893	Cooke, Snow Parker Freeman	Gloucester.
1893	Courtney, Joseph Williams	Roxbury.
1894	Croacher, Anna Wood	New Bedford.
1894	Cumston, Charles Green	Boston.
1893	Cutler, George Washington	Waltham.
1893	Daly, Richard Francis	Boston.
1894	Darling, Eugene Abraham	Boston.
1893	Dearing, Henry Lincoln	Braintree.
1893	Dewis, John William	South Boston.
1894	Dillon, Thomas Joseph Bennett	Brighton.
1894	Dion, Thomas Joseph	West Quincy.
1894	Dolloff, Albert Simeon	Beverly.
1893	Donnelly, John Bernard	West Gardner.
1894	Drown, Edward Payson	Malden.
1894	Dunning, William Meddaugh	Harwich Port.
1893	Edmonds, Louis	Harwich.
1894	Edwards, William Lothrop	Boston.
1893	Eldridge, Jeremiah Allen	Wareham.
1894	Ellison, George Washington	Brookline.
1893	Emerson, Francis Patten	Roxbury.
1893	Erb, Theodore Charles	Boston.
1894	Evans, Sarah Elizabeth	Roxbury.
1893	Farenholt, Ammen	Leominster.
1894	Farrington, Leander Morton	Boston.
1894	Farwell, George Davis	Turner's Falls.
1894	Frame, Joseph	Boston.
1894	Freeman, Franklin Willard	Newton L. Falls.
1893	French, George Henry	Dorchester.
1893	Gage, Edward Franklin	Boston.
1893	Gay, Warren Fisher	Boston.
1893	Goldthwaite, Seth Vale	Dorchester.
1893	Grierson, George Toney	Lowell.

1893	Hall, Mahlon Freeborn	Revere.
1893	Hammond, Philip	Boston.
1893	Haskell, Harry Hill	Boston.
1893	Hassett, John Joseph	Lee.
1894	Hastings, Robert Worthington	Boston.
1893	Higgins, Frank Albert	Boston.
1893	Hogner, Richard Per Gustaf	Boston.
1894	Holmes, Alvin Dennett	Hyde Park.
1894	Hubbard, Osmon Huntley	Walpole.
1894	Ingalls, George Hancock	Jamaica Plain.
1894	Johnson, Orville Edson	Boston.
1893	Jones, William Marks	Lowell.
1893	Kelly, William P	Pittsfield.
1894	Kennedy, Charles Francis Joseph	Springfield.
1893	Kidder, Edward Hamilton	Fall River.
1894	Konikow, Maurice Joseph	Boston.
1894	Lamoureux, Joseph Elzear	Lowell.
1894	Lawrence, John Herbert	Three Rivers.
1893	Leach, Horace Morton	Charlton City.
1893	Leahy, Thomas Joseph	Cambridge.
1894	Leary, James Edward	Lowell.
1894	Lewis, Arthur Cuthbert	Fall River.
1893	Lindström, Alfred Herman	Boston.
1894	Lougee, Mary Williamina	West Roxbury.
1893	Lovewell, Henry Plummer	East Somerville.
1894	Mace, Herbert Eugene	Boston.
1893	McGillicuddy, John Timothy	Worcester.
1893	McKenzie, John Robert	Worcester.
1893	McLeod, Percy DeMille	Boston.
1894	McMillan, Wallace	Dorchester.
1893	Manchester, Delos Burd	Beverly.
1893	Milot, Alphonse Francois	Taunton.
1893	Mitchell, Arthur	Medfield.
1894	Mongan, Charles Edward	Somerville.
1893	Moran, Horace Sheridan	Roxbury.
1893	O'Donnell, Louis Patrick	Somerville.
1893	O'Keefe, Michael Wallace	East Boston.
1893	Page, Albert Kidder	Boston.
1894	Palmer, Alice Elizabeth	Boston.
1893	Palmer, Ezra	Boston.
1893	Parker, Charles Edwin	Princeton.
1894	Parker, Edwin Monroe	South Yarmouth.
1893	Parker, Harriet Eliza	Allston.
1894	Pearce, Richard Mills	Boston.
1893	Pick, Albert	Boston.
1894	Platt, Belle Joanne	Springfield.
1894	Pratt, Charles Augustus	New Bedford.

1894	Ranney, Archibald	Tewksbury.
1893	Reardon, Timothy Joseph	Cambridge.
1894	Richards, Caroline Maria	New Bedford.
1893	Richards, George Lyman	Boston.
1893	Robinson, Gilman Parker	Reading.
1893	Robinson, William Henry	Charlestown.
1893	Rourke, Joseph Edward	Boston.
1893	Sargent, Ara Nathaniel	Salem.
1893	Shaw, Albert Joel	Boston.
1893	Shaw, Arthur John	Boston.
1893	Shurtleff, George Frederick	Westfield.
1894	Slayton, William Taft	Brookline.
1894	Smith, Frederick Glazier	Somerville.
1894	Sopher, Curtis Levi	Wakefield.
1893	Stapleton, Richard Henry	Worcester.
1893	Starbird, Edward Perley	Roxbury.
1893	Starr, Frederick Ratchford	Oakland, Cal.
1893	Stone, Byron	North Oxford.
1894	Swan, Henry Storer	Middleboro'.
1893	Sweetsir, Charles Leslie	Lowell.
1893	Swett, Percy Walter	Rochester, N. Y.
1893	Synan, William Edward	Fall River.
1894	Taylor, Edward Wyllis	Boston.
1893	Ten Broeck, Stanton Jacob	Orange.
1894	Thomas, Caroline Louise	Fall River.
1893	Thornton, James Brown	Boston.
1894	Tinker, Martin Buel	Boston.
1893	Tirrell, Vinson Meader	South Weymouth.
1894	Tucker, Samuel Chase	Peabody.
1894	Walker, William	Roxbury.
1893	Waterman, Jerome Hilton	Buffalo, N. Y.
1894	Welch, Edward John	Lowell.
1893	Wentworth, William Warner	Pittsfield.
1894	Weston, George Dake	Springfield.
1893	Wheat, Arthur Fitts	South Boston.
1893	Wheeler, Alfred Augustus	Boston.
1894	Whipple, Farrington Hasham	Boston.
1893	White, Charles James	Boston.
1893	White, Leon Edward	Roxbury.
1894	White, Walter Henry	Boston.
1894	Whitehill, George Edward	Tewksbury.
1894	Williams, Augusta Gilbert	Brookline.
1894	Williams, Christopher Earle	Cambridgeport.
1894	Wilson, Charles Oscar	Lowell.
1893	Woodward, Johnson Rufus	Oxford.
1894	Wright, James Homer	Boston.
1894	Wylie, Ella Rosalind	Boston.

Total, 153.

List of Deceased Fellows.

Admitted.	Name.	Residence.	Date of Death.	Age.
1847	Bigelow, George Frederic	Boston	Aug. 9, 1893	73
1864	Billings, Lucius Flagg	Barre	Nov. 26, 1893	71
1867	Bodge, James Henry	Newton Centre	Oct. 19, 1893	53
1886	Carter, Cyrus Faulkner	Boston	July 14, 1893	31
1850	Codman, Benjamin Storer	Boston	Feb. 22, 1894	78
1874	Colman, Henry	Lynn	Nov. 11, 1893	53
1859	Crehore, Charles Frederic	Newton L. Falls	Nov. 8, 1893	65
1866	Day, Albert	Melrose High'ds	April 26, 1894	72
1880	Donovan, Samuel Magner	Quincy	Feb. 19, 1894	42
1847	Fogg, David Sylvester	Norwood	Aug. 30, 1893	72
1876	Fogg, William John Gordon	South Boston	Feb. 27, 1894	43
1856	Forsaith, Francis Flint	Weymouth	March 11, 1894	69
1893	Grierson, George Toney	Lowell	Jan. 28, 1894	25
1861	Hartnett, Maurice King	Boston	May 14, 1894	70
1848	Holmes, Howland	Lexington	Nov. 16, 1893	78
1854	Hulbert, Chauncey Munsell	South Dennis	Nov. 6, 1893	75
1873	Latimer, James Abercrombie	East Cambridge	Aug. 10, 1893	46
1866	Logan, Samuel Moore	Jamaica, W. I.	Nov. 20, 1893	65
1882	Lyman, Jabez Baldwin	Salem	June 29, 1893	73
1874	Martin, Stephen Crosby	Brookline	Nov. 5, 1893	43
1886	Murray, Joseph Howe	Jamaica Plain	Aug. 13, 1893	43
1869	Page, Horatio Nelson	Chelsea	Sept. 16, 1893	87
1890	Patterson, John Henry	Harwich	April 29, 1894	31
1872	Pike, Charles Colby	Peabody	Jan. 27, 1894	49
1849	Renton, John	Boston	Dec. 15, 1893	74
1836	Salter, Richard Henry	Boston	Aug. 4, 1893	86
1854	Seaverns, Joel	Roxbury	March 1, 1894	65
1883	Shea, Andrew Francis	Lawrence	July 25, 1893	35
1880	Sherman, Thomas Foster	Boston	Sept. 26, 1893	37
1891	Stebbins, Walter Gay	Boston	Oct. 8, 1893	28
1891	Upton, Francis Marion	Stoneham	March 8, 1894	89
1888	Wardwell, William Tecumseh Sherman	Roslindale	June 24, 1893	32
1839	Wheeler, Elbridge Gerry	Middlefield	Dec. 1893	91
1867	Whitaker, John Birtwistle	Fall River	Aug. 24, 1893	77
1884	Willard, Oliver Augustus	Lowell	Jan. 7, 1894	38
1883	Woodbury, George Franklin	Worcester	June 18, 1893	41

Total, 36

The Treasurer, Dr. Forster, presented his annual report.

Voted, That when the Society adjourns it be to 1, P.M., on the first Wednesday in October, 1894, at the place where the Councillors shall meet on that day, to act on amendments to the By-Laws and any other matters that may legally come before them.

Dr. Abbott, Chairman of the Committee appointed in 1892 to consider whether any changes are necessary in the classification and nomenclature employed in the vital statistics of this State, offered the following, which was adopted:

Resolved, That this Society deems it advisable that the Nomenclature and Classification of the Causes of Death, which form the basis for the certificates of death required from physicians in Massachusetts, should be regularly submitted, in accordance with a statutory requirement, to a competent Board, once in ten years, for such revision as the progress of medicine may demand.

Papers were read as follows :—

Ichthyol in Gynecology.—By Dr. Malcolm Storer, of Boston.

Chronic Inflammation of the Seminal Vesicles.—By Dr. G. W. Allen, of Boston.

The Frequency of Puerperal Sepsis in Massachusetts, its Diagnosis and Efficient Treatment.—By Dr. Edward Reynolds, of Boston.

Discussion by Drs. E. H. Stevens, of North Cambridge; W. S. Brown, of Stoneham; E. Chenery and C. M. Green, of Boston.

The following delegates from other State Medical Societies were present :—

Maine.—Dr. J. W. Bowers.
Vermont.—Dr. S. W. Paige.
Rhode Island.—Dr. J. F. Noyes.

Dr. Noyes presented the greetings of his Society.

At 12 o'clock the Annual Discourse was delivered by Dr. Reginald H. Fitz, of Boston.

Voted,—That the thanks of the Society be presented to Dr. Fitz for his able, interesting and instructive address.

The President introduced the President-elect, Dr. Franklin K. Paddock, of Pittsfield.

At 1, p.m., the Annual Dinner, presided over by the Anniversary Chairman, Dr. Silas D. Presbrey, was served to eight hundred and fifty Fellows and invited guests.

FRANCIS W. GOSS,
Recording Secretary.

TREASURER'S REPORT.

THE Treasurer presents the following report for the year ending 15 April, 1894.

The invested funds are as follows:

The Permanent Fund		$11,253 30
The Shattuck Fund		9,166 87
The Phillips Fund		10,000 00
The Cotting Fund		3,000 00
		$33,420 17

The balance on hand of cash at the beginning of the year was		$2,036 41
The Receipts have been:—		
Excess on sale of £1. 1. order		04
Assessments paid direct to the Treasurer		1,240 00
Assessments paid to District Treasurers:		
Barnstable	$90 00	
Berkshire	200 00	
Bristol North	225 00	
Bristol South	275 00	
Essex North	355 00	
Essex South	455 00	
Franklin	140 00	
Hampden	345 00	
Hampshire	225 00	
Middlesex East	140 00	
Middlesex North	425 00	
Middlesex South	950 00	
Norfolk	870 00	
Norfolk South	110 00	
Plymouth	110 00	
Suffolk	1,610 00	
Worcester	600 00	
Worcester North	110 00	
		7,235 00
Income:		
Permanent Fund	$450 12	
Shattuck Fund	366 67	
Phillips Fund	400 00	
Cotting Fund	40 40	
Interest on cash balance	100 28	
		1,357 47
Sale of extra dinner tickets		14 00
Sale of Diploma		5 00
Making a total of		$11,887 92

The Expenses have been :

The Annual Meeting and Dinner :		
Stereopticon	$5 00	
Advertising	1 38	
Rent of hall	475 00	
Signs	10 00	
Ticket takers, police, janitor, ice, etc.	42 50	
Printing, postage, and stationery	30 25	
Stenographers	40 00	
Flowers	90 00	
Music	104 00	
Caterer	1,630 00	
Cigars	75 00	
Barges	19 90	
		$2,523 03
Salaries in full to 15 April, 1894		1,050 00
Treasurer's expense :		
Printing, postage and stationery		154 55
Recording Secretary's expense :		
Printing, postage and stationery		140 27
Librarian's expense :		
Printing, postage and stationery and express		216 76
District Treasurer's expense :		
Commissions and incidentals		405 99
Censors' expense :		
Fees, advertising and stationery		571 24
Committee on Publications :		
By-Laws	$59 25	
Braithwaite's Retrospect	1,017 45	
Communications and Transactions	645 00	
The Shattuck Lecturer	200 00	
Printing	53 50	
		1,975 20
The Cotting Lunch for Councillors		117 54
Annual Rent		150 00
Dividend distributed to the District Societies		1,400 00
Sundry expenses for Catalogue		190 51
Making the total expenses,		$8,895 09
Leaving a balance on hand of		$2,992 83

This balance is distributed as follows :

Unexpended income of Shattuck Fund	$348 49
Unexpended income of Cotting Fund	7 27
Unexpended general income	2,637 07
	$2,992 83

Dr. TRIAL BALANCE—13 April, 1894. Cr.

Cash	$2,992 83	Property	$33,420 17
Permanent Fund Investment	11,253 30	Permanent Fund	11,253 30
Shattuck Fund Investment	9,166 87	Shattuck Fund	9,166 87
Cotting Fund Investment	3,000 00	Cotting Fund	3,000 00
Phillips Fund Investment	10,000 00	Phillips Fund	10,000 00
Mass. Hosp. Life Ins. Co.	20,420 17	Shattuck Fund Income	348 49
Provident Ins. Savings	1,000 00	Cotting Fund Income	7 27
Suffolk Savings Bank	1,000 00	Profit and loss	2,637 07
Roxbury Ins. for Savings	1,000 00		
U. S. 4% Bonds	10,000 00		
	$69,833 17		$69,833 17

The instructions to place in the hands of the Librarian such books as are not in present use, have been complied with, and I have deposited with that officer the ledgers, eleven in number, making a complete series from 1781 to 1891 inclusive.

Two volumes of accounts with the District Societies, 1869 to 1888 inclusive.

Two volumes recording the changes in Fellowship as they occurred from 1880 to 1891.

One volume containing the signatures of Fellows from 1850 to 1860 inclusive.

One volume containing a record of the invested funds.

One package of postal cards, being the replies received to inquiries made during the preparation of the last Catalogue.

The foregoing are all contained in a chest specially made to preserve the valuable series of ledgers.

I have also deposited with the Custodian one volume entitled "TREASURER'S ACCOUNTS, AND LIST OF LETTERS TO FELLOWS OF MASS. MED. SOC. FROM JUNE, 1812."

Two volumes, Nos. XXIV. and XXV. of Adhesive Files, containing the correspondence relating to the Catalogue just issued.

Also volumes No. I. to XIX. of Adhesive Files, containing the correspondence and papers of this office, and received from my predecessor.

A manuscript volume containing a list of all who have been licentiates of the Society; prepared from the early records.

A bound interleaved copy of the Catalogue of 1840, with annotations.

A bound interleaved copy of the Catalogue of 1855, with annotations.

A bound copy of the Catalogue of 1875, with annotations and corrections from the ledgers. These three volumes were used in the preparation of the Catalogue.

I have also the pleasure to state that a Catalogue has been prepared containing the names of Officers, Fellows and Licentiates from the organization of the Society in 1781 to the beginning of the present year.

The delay in its preparation has been due to the unexpected amount of research required.

An edition of 3000 has been printed and delivered to the Librarian for distribution as voted by the Council at its last meeting.

All of which is respectfully submitted.

EDWARD JACOB FORSTER,

BOSTON, 12 JUNE, 1894. *Treasurer.*

BOSTON, MAY 31ST, 1894.

The undersigned, a duly appointed Auditing Committee, having examined the books of the Treasurer, find them correctly cast and properly vouched; and also find that he has in his possession the various securities and funds called for.

GEORGE G. TARBELL,
A. D. SINCLAIR, } *Committee.*

Officers of the Massachusetts Medical Society.

1894—1895.

Chosen June 12, 1894.

FRANKLIN K. PADDOCK, Pittsfield, . President.
FREDERIC A. SAWYER, . Wareham, . Vice-President.
EDWARD J. FORSTER, . Boston, . . Treasurer.
CHARLES W. SWAN, . . Boston, . . Cor. Secretary.
FRANCIS W. GOSS, . . . Roxbury, . Rec. Secretary.
EDWIN H. BRIGHAM, . . Boston, . . Librarian.

ALFRED WORCESTER, . Waltham, . Orator.
HERBERT L. BURRELL, . Boston, . . Anniv. Chairman.

Standing Committees.

Of Arrangements.

H. Jackson, A. Thorndike, J. G. Mumford,
J. C. Munro, A. K. Stone, M. V. Pierce.

On Publications.

B. E. Cotting, O. F. Wadsworth, G. B. Shattuck.

On Membership and Finances.

F. W. Draper, J. Stedman, E. G. Cutler,
L. R. Stone, A. H. Johnson.

To Procure Scientific Papers.

H. P. Bowditch, H. L. Burrell, L. Wheeler,
F. H. Zabriskie, S. W. Woodward, C. W. Townsend.

On Ethics and Discipline.

G. E. Francis, F. C. Shattuck, C. G. Carleton,
E. Cowles, J. F. A. Adams.

On Medical Diplomas.

E. J. Forster, H. E. Marion, E. N. Whittier.

Presidents of District Societies—Vice-Presidents (Ex-Officiis).

(Arranged according to Seniority.)

O. Warren,
F. C. Plunkett,
F. W. Brigham,
D. Coggin,
D. D. Gilbert,
H. E. Marion,
C. C. Odlin,
J. W. Spooner,
A. L. Mason,
E. A. Chase,
A. M. Pierce,
E. P. Miller,
E. F. Galligan,
G. D. Thayer,
G. P. Twitchell,
H. S. Kelley, Jr.
G. S. Hatch.
W. H. Deane.

Councillors.

Barnstable.—Drs. B. D. Gifford, Chatham; S. T. Davis, Orleans; E. E. Hawes, Hyannis.

Berkshire.—Drs. J. F. A. Adams, Pittsfield; O. J. Brown, North Adams; F. K. Paddock, Pittsfield, *President;* W. W. Scofield, Dalton; W. P. Small, Great Barrington; L. D. Woodbridge, Williamstown.

Bristol North.—Drs. H. B. Baker, South Dighton; J. B. Gerould, North Attleboro'; F. A. Hubbard, S. D. Presbrey, W. S. Robinson, Taunton.

Bristol South.—Drs. W. A. Dolan, B. J. Handy, Fall River; S. W. Hayes, G. De N. Hough, New Bedford; W. T. Learned, Fall River; C. D. Prescott, New Bedford; E. M. Whitney, Fairhaven.

Essex North.—Drs. B. W. Bartlett, Rowley; C. N. Chamberlain, H. M. Chase, Lawrence; M. D. Clarke, Haverhill; H. J. Cushing, Merrimac; E. P. Hurd, Newburyport; H. G. Leslie, Amesbury; C. P. Morrill, North Andover; J. Peirce, Methuen; R. B. Root, Georgetown.

Essex South.—Drs. J. Allen, Topsfield; P. Eveleth, Marblehead; H. K. Foster, Peabody; C. W. Haddock, T. Hayes, Beverly; W. E. Holbrook, C. E. Jenkins, Lynn; A. H. Johnson, Salem; G. N. Jones, Gloucester; C. E. Meader, Lynn; C. W. Page, Danvers; E. L. Peirson, E. Poirier, Salem; J. G. Pinkham, Lynn; J. Shanahan, Peabody.

FRANKLIN.—Drs. A. C. Deane, Greenfield; J. H. Goddard, Orange; A. C. Walker, Greenfield.

HAMPDEN.—Drs. E. B. Adams, D. J. Brown, Springfield; U. H. Flagg, Mittineague; G. E. Fuller, Monson; W. Holbrook, Palmer; J. W. Hannum, Ludlow; J. C. Hubbard, Holyoke; D. E. Keefe, O. H. Kelsey, G. S. Stebbins, Springfield; G. F. Shurtleff, Westfield.

HAMPSHIRE.—Drs. C. M. Barton, Hatfield; F. Bonnêy, Hadley; J. Dunlap, C. Seymour, Northampton; W. P. Stutson, Cummington.

MIDDLESEX EAST.—Drs. S. W. Abbott, Wakefield; J. S. Clark, Melrose; J. M. Harlow, S. W. Kelley, Woburn; G. W. Nickerson, Stoneham.

MIDDLESEX NORTH.—Drs. H. R. Brissett, F. W. Chadbourne, C. M. Fisk, Lowell; A. Howard, Chelmsford; H. B. Howard, Tewksbury; W. B. Jackson, W. A. Johnson, Lowell; W. J. Sleeper, Westford; C. P. Spalding, E. W. Trueworthy, J. B. Wentworth, Lowell.

MIDDLESEX SOUTH.—Drs. Z. B. Adams, Framingham; W. H. Baker, Waltham; W. A. Bell, Somerville; R. A. Blood, Charlestown; J. F. Couch, E. Cowles, Somerville; E. R. Cutler, Waltham; T. M. Durell, Somerville; W. Ela, Cambridge; J. F. Frisbie, Newton; J. L. Harriman, Hudson; J. L. Hildreth, Cambridge; E. G. Hoitt, Marlboro'; R. P. Loring, Newton Centre; H. S. Marion, Brighton; H. B. McIntire, Cambridge; J. A. Mead, Watertown; M. A. Morris, Charlestown; J. T. G. Nichols, Cambridge; E. H. Stevens, North Cambridge; L. R. Stone, Newton; J. L. Sullivan, Malden; J. O. Tilton, Lexington; G. E. Titcomb, Concord; G. J. Townsend, South Natick; C. E. Vaughan, H. P. Walcott, Cambridge; J. W. Willis, A. Worcester, Waltham; M. Wyman, Cambridge.

NORFOLK.—Drs. E. H. Baxter, Hyde Park; A. W Blair, A. B. Coffin, S. Crowell, Dorchester; S. M. Crawford, P. O'M. Edson, Roxbury; G. H. Francis, Brookline; T. Garceau, Roxbury; J. S. Greene, Dorchester; A. R. Holmes, Canton; J. Kittredge, Brookline; W. B. Lancaster, Wellesley Hills; J. P. Maynard,

Dedham; E. C. Norton, Norwood; A. P. Perry, Jamaica Plain; M. V. Pierce, Milton; L. H. Plimpton, Norwood; O. F. Rogers, Dorchester; G. K. Sabine, Brookline; I. W. Starbird, Dorchester; J. Stedman, Jamaica Plain; G. B. Stevens, Roxbury; J. A. Tanner, E. T. Twitchell, Dorchester; C. R. Whitcombe, Roslindale; H. W. White, Roxbury; J. A. Winkler, Jamaica Plain.

NORFOLK SOUTH.—Drs. T. H. Dearing, Braintree; E. N. Mayberry, South Weymouth; J. F. Welch, Quincy.

PLYMOUTH.—Drs. W. G. Brown, Duxbury; H. W. Dudley, Abington; S. J. Gruver, Brockton; B. F. Hastings, Whitman; A. E. Paine, Brockton; F. G. Wheatley, North Abington.

SUFFOLK.—Drs. S. L. Abbot, J. B. Ayer, H. J. Barnes, A. N. Blodgett, E. H. Brigham, *Librarian*, F. H. Brown, E. M. Buckingham, F. E. Bundy, H. L. Burrell, J. F. Bush, A. T. Cabot, B. F. Campbell, J. R. Chadwick, D. W. Cheever, E. G. Cutler, F. H. Davenport, F. W. Draper, R. D. Elliott, Boston; T. W. Fisher, South Boston; R. H. Fitz, C. F. Folsom, E. J. Forster, *Treasurer*, G. M. Garland, Boston; M. F. Gavin, South Boston; G. W. Gay, C. M. Green, F. B. Greenough, A. R. Hahn, W. H. H. Hastings, W. C. Holyoke, J. Homans, W. Ingalls, B. J. Jeffries, F. I. Knight, A. L. Mason, J. H. McCollom, F. Minot, J. J. Minot, A. B. Morong, A. H. Nichols, C. B. Porter, A. Post, Boston; J. M. Putnam, Chelsea; M. H. Richardson, W. L. Richardson, T. M. Rotch, F. C. Shattuck, G. B. Shattuck, A. D. Sinclair, A. M. Sumner, C. W. Swan, *Corresponding Secretary*, G. G. Tarbell, O. F. Wadsworth, J. C. Warren, J. C. White, W. F. Whitney, E. N. Whittier, H. W. Williams, Boston.

WORCESTER.—Drs. M. Bemis, Worcester; A. G. Blodgett, West Brookfield; F. W. Brigham, Shrewsbury; P. P. Comey, Clinton; W. Davis, G. E. Francis, T. H. Gage, Worcester; E. B. Harvey, Westboro'; J. W. Hastings, Warren; S. P. Holbrook, East Douglas; H. S. Knight, J. O. Marble, Worcester; G. C. Webber, Milbury; E. R. Wheeler, Spencer; L. Wheeler, A. Wood, Worcester.

WORCESTER NORTH.—Drs. R. F. Andrews, Gardner; E. J. Cutter, Leominster; L. G. Chandler, Townsend; J. W. Stimson, F. H. Thompson, Fitchburg.

Censors.

BARNSTABLE.—Drs. W. S. Birge, Provincetown; G. W. Doane, Hyannis; F. W. Pierce, Marston's Mills; J. E. Pratt, Sandwich; F. A. Rogers, Chatham.

BERKSHIRE.—Drs. T. C. Burnett, Stockbridge; H. Bushnell, North Adams; W. W. Leavitt, W. M. Mercer, Pittsfield; A. T. Wakefield, Sheffield.

BRISTOL NORTH.—Drs. E. J. Bassett, M. Perry, Taunton; J. B. Gerould, H. S. Kilby, North Attleboro'; A. M. Round, Norton.

BRISTOL SOUTH.—Drs. J. T. Bullard, New Bedford; D. E. Cone, Fall River; J. M. Mackenzie, W. N. Swift, J. F. Weeks, New Bedford.

ESSEX NORTH.—Drs. F. W. Anthony, Bradford; C. E. Durant, Haverhill; F. W. Kennedy, Lawrence; E. H. Noyes, Newburyport; F. E. Sweetsir, Merrimac.

ESSEX SOUTH.—Drs. F. W. Baldwin, Danvers; J. A. Bedard, F. A. Morse, Lynn; J. E. Simpson, Salem; W. H. Swan, Beverly.

FRANKLIN. Drs. E. G. Best, Turner's Falls; F. J. Canedy, F. H. Drew, Shelburne Falls; C. L. Fisk, jr., Greenfield; C. G. Trow, Sunderland.

HAMPDEN.—Drs. D. F. Donoghue, Holyoke; R. P. M. Ames, M. Calkins, R. H. Seelye, A. O. Squire, Springfield.

HAMPSHIRE.—Drs. J. C. Fahey, A. H. Hoadley, C. M. Holmes, Northampton; H. H. Seelye, Amherst; E. S. Winslow, Easthampton.

MIDDLESEX EAST.—Drs. H. G. Blake, Woburn; M. A. Cummings, Winchester; C. W. Harlow, F. H. Morse, Melrose; J. W. Heath, Wakefield.

MIDDLESEX NORTH.—Drs. R. E. Bell, J. B. Field, J. A. Gage, O. P. Porter, C. A. Viles, Lowell.

MIDDLESEX SOUTH.—Drs. D. E. Baker, Newtonville; J. E. Cleaves, Medford; H. F. Curtis, East Somerville; C. E. Prior, Malden; W. D. Swan, Cambridge.

NORFOLK.—Drs. B. S. Blanchard, H. M. Cutts, Brookline; D. G. Eldridge, E. B. Lane, Dorchester; C. W. Sparhawk, West Roxbury.

NORFOLK SOUTH.—Drs. H. L. Dearing, Braintree; F. C. Granger, Randolph; N. S. Hunting, Quincy; J. H. Robbins, Hingham; G. W. Tinkham, Weymouth.

PLYMOUTH.—Drs. H. F. Borden, W. P. Chisholm, A. V. Lyon, Brockton; A. A. MacKeen, Whitman; G. Osgood, Rockland.

SUFFOLK.—Drs. F. H. Davenport, F. B. Harrington, R. W. Lovett, E. O. Otis, H. F. Vickery, Boston.

WORCESTER.—Drs. W. T. Clark, Worcester; W. B. Cushman, Oxford; E. W. Norwood, Spencer; E. H. Trowbridge, G. O. Ward, Worcester.

WORCESTER NORTH.—Drs. E. L. Fiske, Fitchburg; J. G. Henry, Winchendon; H. H. Lyons, A. P. Mason, C. W. Spring, Fitchburg.

Commissioners of Trials.

BARNSTABLE	R. H. Faunce	Sandwich.
BERKSHIRE	F. K. Paddock	Pittsfield.
BRISTOL NORTH	J. P. Brown	Taunton.
BRISTOL SOUTH	A. B. Paun	Middleboro'.
ESSEX NORTH	F. A. Howe	Newburyport.
ESSEX SOUTH	C. A. Lovejoy	Lynn.
FRANKLIN	C. Bowker	Bernardston.
HAMPDEN	S. D. Brooks	Springfield.
HAMPSHIRE	C. R. Gardner	Northampton.
MIDDLESEX EAST	S. H. Parks	Reading.
MIDDLESEX NORTH	L. Huntress	Lowell.
MIDDLESEX SOUTH		
NORFOLK	B. E. Cotting	Roxbury.
NORFOLK SOUTH	J. A. Gordon	Quincy.
PLYMOUTH	J. B. Brewster	Plymouth.
SUFFOLK	C. W. Swan	Boston.
WORCESTER	E. Warner	Worcester.
WORCESTER NORTH	F. W. Russell	Winchendon.

Officers of the District Medical Societies.

Barnstable.—Dr. H. S. Kelley, Jr., Dennisport, *President*; Dr. E. E. Hawes, Hyannis, *Vice-President*; Dr. F. W. Pierce, Marston's Mills, *Secretary;* Dr. G. N. Munsell, Harwich, *Treasurer.*

Berkshire.—Dr. G. S. Hatch, Pittsfield, *President;* Dr. O. J. Brown, North Adams, *Vice-President;* Dr. H. Colt, Pittsfield, *Secretary;* Dr. W. L. Paddock, Pittsfield, *Treasurer;* Dr. W. W. Leavitt, Pittsfield, *Librarian.*

Bristol North.—Dr. E. F. Galligan, Taunton, *President;* Dr. A. S. Deane, Taunton, *Vice-President;* Dr. E. Washburn, Taunton, *Secretary;* Dr. W. Y. Fox, Taunton, *Treasurer;* Dr. M. Perry, Taunton, *Librarian.*

Bristol South.—Dr. A. M. Pierce, New Bedford, *President;* Dr. S. W. Bowen, Fall River, *Vice-President;* Dr. A. J. Abbe, Fall River, *Secretary, Treasurer and Librarian.*

Essex North.—Dr. O. Warren, West Newbury, *President;* Dr. J. F. Young, Newburyport, *Vice-President;* Dr. M. D. Clarke, Haverhill, *Secretary and Treasurer.*

Essex South.— Dr. D. Coggin, Salem, *President;* Dr. E. A. Kemp, Danvers, *Vice-President;* Dr. Myra A. Ruppel, Lynn, *Secretary;* Dr. G. Z. Goodell, Salem, *Treasurer;* Dr. H. Phippen, Salem, *Librarian.*

Franklin.—Dr. G. P. Twitchell, Greenfield, *President;* Dr. N. P. Wood, Northfield, *Vice-President;* Dr. F. H. Zabriskie, Greenfield, *Secretary and Treasurer.*

Hampden.—Dr. W. H. Deane, Blandford, *President;* Dr. E. E. Maryott, Springfield, *Vice-President;* Dr. A. J. Dunne, Springfield, *Secretary and Treasurer.*

Hampshire.—Dr. G. D. Thayer, Northampton, *President;* Dr. J. M. Fay, Northampton, *Vice-President;* Dr. A. H. Hoadley, Northampton, *Secretary;* Dr. C. W. Cooper, Northampton, *Treasurer;* Dr. S. A. Clark, Northampton, *Librarian.*

MIDDLESEX EAST.—Dr. C. C. Odlin, Melrose, *President;* Dr. D. March, Jr., Winchester, *Vice-President;* Dr. E. S. Jack, Melrose, *Secretary;* Dr. F. W. Graves, Woburn, *Treasurer.*

MIDDLESEX NORTH.—Dr. F. C. Plunkett, Lowell, *President;* Dr. J. C. Irish, Lowell, *Vice-President;* Dr. W. G. Eaton, Lowell, *Secretary;* Dr. C. P. Spalding, Lowell, *Treasurer;* Dr. C. M. Frye, Lowell, *Librarian.*

MIDDLESEX SOUTH.—Dr. H. E. Marion, Brighton, *President;* Dr. G. C. Pierce, Ashland, *Vice-President;* Dr. A. August, Cambridge, *Secretary;* Dr. W. Ela, Cambridge, *Treasurer;* Dr. F. M. Sherman, Newton Lower Falls, *Librarian.*

NORFOLK.—Dr. D. D. Gilbert, Dorchester, *President;* Dr. R. T. Edes, Jamaica Plain, *Vice-President;* Dr. J. C. D. Pigeon, Roxbury, *Secretary and Librarian;* Dr. E. G. Morse, Roxbury, *Treasurer.*

NORFOLK SOUTH.—Dr. J. W. Spooner, Hingham, *President;* Dr. J. C. Frazer, East Weymouth, *Vice-President;* Dr. J. F. Welch, Quincy, *Secretary and Treasurer;* Dr. S. C. Bridgham, South Braintree, *Librarian.*

PLYMOUTH.—Dr. E. A. Chase, Brockton, *President;* Dr. J. E. Bacon, Brockton, *Vice-President;* Dr. F. J. Ripley, Brockton, *Secretary and Treasurer;* Dr. H. N. Jones, Kingston, *Librarian.*

SUFFOLK.—Dr. A. L. Mason, Boston, *President;* Dr. J. G. Blake, Boston, *Vice-President;* Dr. H. L. Smith, Boston, *Secretary;* Dr. E. M. Buckingham, Boston, *Treasurer;* Dr. B. J. Jeffries, Boston, *Librarian.*

WORCESTER.—Dr. F. W. Brigham, Shrewsbury, *President;* Dr. L. Wheeler, Worcester, *Vice-President;* Dr. G. O. Ward, Worcester, *Secretary;* Dr. H. Gage, Worcester, *Treasurer;* Dr. A. C. Getchell, Worcester, *Librarian.*

WORCESTER NORTH.—Dr. E. P. Miller, Fitchburg, *President;* Dr. L. G. Chandler, Townsend, *Vice-President;* Dr. C. W. Spring, Fitchburg, *Secretary;* Dr. E. L. Fiske, Fitchburg, *Treasurer;* Dr. A. P. Mason, Fitchburg, *Librarian.*

Massachusetts Medical Society.

PROCEEDINGS OF THE COUNCILLORS.

October 3, 1894.

A Stated Meeting of the Councillors was held in the hall of the Medical Library Association, No. 19 Boylston Place, Boston, on Wednesday, October 3, 1894, at 11 o'clock, A.M.

The President, Dr. Frank K. Paddock, in the chair.

The following Councillors were present:

Barnstable.
B. D. Gifford.

Berkshire.
J. F. A. Adams,
F. K. Paddock,
L. D. Woodbridge.

Bristol North.
S. D. Presbrey.

Bristol South.
W. A. Dolan,
G. DeN. Hough.

Essex North.
B. W. Bartlett,
M. D. Clarke,
E. P. Hurd,
H. G. Leslie.

Essex South.
J. Allen,
H. K. Foster,
T. J. Hayes,
W. E. Holbrook,
A. H. Johnson,
E. L. Peirson,
E. Poirier,
J. Shanahan.

Hampden.
G. E. Fuller,
G. F. Shurtleff.

Middlesex East.
J. S. Clark.

Middlesex North.
H. R. Brissett,
F. W. Chadbourne,
W. B. Jackson,
W. J. Sleeper,
C. P. Spalding.

Middlesex South.
Z. B. Adams,
W. H. Baker,
R. A. Blood,
J. F. Couch,
E. Cowles,
T. M. Durell,
W. Ela,
J. F. Frisbie,
J. L. Hildreth,
R. P. Loring,
L. R. Stone,
J. L. Sullivan,
G. E. Titcomb,
G. J. Townsend,
C. E. Vaughan,
H. P. Walcott,
J. W. Willis,
M. Wyman.

Norfolk.
A. W. Blair,
A. B. Coffin,
S. M. Crawford,
S. Crowell,
G. H. Francis,
J. S. Greene,
W. B. Lancaster,
J. P. Maynard,
A. P. Perry,
M. V. Pierce,
O. F. Rogers,
I. W. Starbird,

G. B. Stevens,
C. R. Whitcombe,
J. A. Winkler,
H. W. White.

Norfolk South.

E. N. Mayberry.

Plymouth.

H. W. Dudley,
B. F. Hastings,
A. E. Paine,
F. G. Wheatley.

Suffolk.

J. B. Ayer,
H. J. Barnes,
E. H. Brigham,
F. E. Bundy,
J. F. Bush,
A. T. Cabot,
J. R. Chadwick,
D. W. Cheever,
E. G. Cutler,
F. H. Davenport,
F. W. Draper,
T. W. Fisher,
E. J. Forster,
G. M. Garland,
M. F. Gavin,
C. M. Green,
A. R. Hahn,
W. H. H. Hastings,
W. C. Holyoke,
J. Homans,
W. Ingalls,
F. I. Knight,
A. L. Mason,
J. H. McCollom.
F. Minot,
J. J. Minot,
A. B. Morong,
A. H. Nichols,
J. M. Putnam,
W. L. Richardson,
T. M. Rotch,
G. B. Shattuck,
A. D. Sinclair,
O. F. Wadsworth,
J. C. Warren,
J. C. White,
W. F. Whitney,
E. N. Whittier,
H. W. Williams.

Worcester.

S. P. Holbrook,
J. O. Marble.

Worcester North.

E. J. Cutter.

Total, 108.

The record of the previous meeting was read and accepted.

The following were appointed Delegates to other State Medical Societies:

Vermont.—Drs. C. Seymour, of Northampton; O. J. Brown, of North Adams.

New York.—Drs. W. W. Leavitt, of Pittsfield; W. W. Scofield, of Dalton.

New York State Medical Association.—Drs. J. B. Ayer, E. M. Buckingham, of Boston.

The chair announced that he had appointed the following to constitute, with the President, the Committee on State and National Legislation:

Drs. H. P. Walcott, H. P. Bowditch, T. H. Gage, S. D. Presbrey.

Voted, that the following be allowed to retire:

William Henry Thayer, of Berkshire.

Also that the following be restored:

Daniel Stanislaus Harkins, of Dorchester.

The Committee on Publications reported, and it was voted on their recommendation, that the hour of the annual meeting of the Councillors be changed to 7 P.M., and that of the Shattuck Lecture to 1 P.M., on the day preceding the annual meeting of the Society.

Voted, to amend Rule 9 of the Rules and Orders of the Councillors by inserting after the word "chair" the words "at the annual dinner."

Dr. Forster offered the following amendments to By-Laws VI. and VII:

By-Law VI. Strike out lines 11–13 on page 11, viz:

"Any Fellow removing out of the State may have liberty to retain his Fellowship so long, and only so long, as he punctually pays the annual assessment."

Also, in lines 14 and 15 the words "lost his Fellowship by removal from the State," and substitute therefor the words "been dropped from the Roll of Fellows by a vote of the Councillors," so that the By-Law shall read:

VI. Any Fellow, whose dues have been paid or remitted, may, on written application and for satisfactory reasons, first examined and reported upon by a Committee, be allowed to resign Fellowship and to withdraw from the Society by a vote of the Councillors.

Any one who has retired or resigned, or been dropped from the Roll of Fellows by a vote of the Councillors, may, on application in writing, be restored to full Fellowship by the vote of the Councillors at any Stated Meeting.

By-Law VII. Strike out the word "five" in line 19, page 11, and substitute therefor the word "three." The first paragraph will then read:

VII. Any Fellow who has not paid an assessment to the Society for three consecutive years, and who, after due notification of his delinquency, neglects, or declines, without sufficient excuse, to pay his dues, may, on report of the Committee on Membership and Resignations, be dropped from the Roll of Fellows by a vote of the Councillors.

Voted, that the above amendments be adopted.

Adjourned at 12 M.

FRANCIS W. GOSS,
Recording Secretary.

February 6, 1895.

A Stated Meeting of the Councillors was held in the hall of the Medical Library Association, No. 19 Boylston Place, Boston, on Wednesday, February 6, 1895, at 11 o'clock A.M.

The President, Dr. Frank K. Paddock, in the chair.

The following Councillors were present:

Berkshire.
J. F. A. Adams,
F. K. Paddock,
L. D. Woodbridge.

Bristol North.
S. D. Presbrey,
W. S. Robinson.

Essex North.
B. W. Bartlett,
E. P. Hurd.

Essex South.
J. Allen,
H. K. Foster,
T. J. Hayes,
C. W. Haddock,
A. H. Johnson,
G. N. Jones,
C. E. Meader,
C. W. Page,
E. Poirier,
J. Shanahan.

Hampden.
G. F. Shurtleff.

Middlesex East.
J. S. Clark.

Middlesex North.
H. B. Howard,
J. B. Wentworth.

Middlesex South.
Z. B. Adams,
W. H. Baker,
W. Ela,
J. L. Hildreth,
H. E. Marion,
J. A. Mead.
J. T. G. Nichols,
L. R. Stone,
J. L. Sullivan,
H. P. Walcott,
J. W. Willis.

Norfolk.
E. H. Baxter,
A. W. Blair,
A. B. Coffin,
G. H. Francis,
T. Garceau,
J. S. Greene,
J. P. Maynard,
E. C. Norton,
A. P. Perry,
M. V. Pierce,
J. Stedman,
H. W. White.

Norfolk South.
T. H. Dearing,
E. N. Mayberry,
J. F. Welch.

Plymouth.
W. G. Brown,
H. W. Dudley,
A. E. Paine,
F. G. Wheatley.

Suffolk.
J. B. Ayer,
H. J. Barnes,
A. N. Blodgett,
E. H. Brigham,
F. H. Brown,
E. M. Buckingham,
H. L. Burrell,
J. F. Bush,
B. F. Campbell,
D. W. Cheever,
E. G. Cutler,
F. H. Davenport,
F. W. Draper,
C. F. Folsom,
E. J. Forster,
G. W. Gay,
C. M. Green,
A. R. Hahn,
W. H. H. Hastings,
W. C. Holyoke,
J. Homans,
W. Ingalls,
A. L. Mason,
J. H. McCollom,
A. B. Morong,
A. Post,
J. M. Putnam,
M. H. Richardson,
W. L. Richardson,

F. C. Shattuck, E. N. Whittier. S. P. Holbrook.
A. D. Sinclair,
A. M. Sumner, *Worcester.* *Worcester North.*
O. F. Wadsworth, W. Davis, E. J. Cutter,
J. C. Warren, T. H. Gage, F. H. Thompson.
J. C. White, E. B. Harvey, Total, 93.

The record of the last meeting was read and accepted.

The following were appointed Delegates to other State Medical Societies:

Maine.—Drs. R. T. Edes, of Jamaica Plain; J. F. A. Adams, of Pittsfield.

New Hampshire.—Drs. O. Warren, of West Newbury; W. S. Everett, of Hyde Park.

Rhode Island.—Drs. J. R. Bronson, of Attleboro'; A. M. Pierce, of New Bedford.

Connecticut.—Drs. T. F. Breck, of Springfield; A. Wood, of Worcester.

New Jersey.—Drs. T. H. Gage, of Worcester; C. P. Hooker, of Springfield.

The following Committees were appointed:

To Audit the Treasurer's Account.—Drs. A. D. Sinclair, Walter Ela.

On Committee of Arrangements.—Dr. Paul Thorndike.

The Committee on Membership and Finances reported through Dr. Draper. In accordance with their recommendation it was voted that the following be allowed to resign:

Frederick Tuckerman, of Amherst.
Charles Getz, of Baltimore, Md.

Also, that the following be allowed to retire:

William Johnson Dale, of North Andover.

Also, that the following be dropped from the Roll of Fellows, on account of three years' delinquency in assessment dues:

Patrick Henry Campbell, of Dorchester.
Theodore Everett, of Roxbury.
Joseph H. Maynard-Bellerose.
James Henry Wright, of Natick.

The Committee appointed at the last meeting to consider the proposed amendment to By-Law XVII., making the ratio of Councillors one in twelve, instead of one in eight, of the membership of the District Societies, reported through Dr. White, as follows:

The present proportion of Councillors, 1 to 8, was fixed when the Society was much smaller. It has become a large unwieldy assembly, numbering 226, and is rapidly increasing. It is altogether too large for a deliberate, executive body; much larger than is appointed for similar functions by corporations, as directors, trustees, legislators, and the like.

If the amendment be adopted, the Council would still consist of 150 members, and even the smallest districts, composed of such small numbers as 21, 28, 32 respectively, and which have at present three Councillors, would still have two representatives each. Suffolk has now 58 Councillors, an absurdly large representation.

In the opinion of your Committee the duties of the Council would be more easily and fitly performed, if its numbers were reduced to the proposed ratio.

In accordance with the recommendation of the Committee, amended by Dr. Harvey, it was voted, that By-Law XVII. be amended so that it shall read:

XVII. Councillors shall be chosen by the District Societies, as directed in By-Law XIII.; each Society choosing, from among the Fellows residing within its District, in the proportion of one Councillor to every twelve Fellows, or a majority fraction thereof.

The following amendment to Rule 7, of the Rules and Orders of the Councillors, as announced in the call of the meeting was passed:

Strike out so much of Rule 7 as provides for the choosing of a Committee to examine the By-Laws of the District Societies, viz., the words, "and a Committee to examine the By-Laws of the District Societies, to see whether they conform to the Laws of the State and of the State Society."

Adjourned at 12.50 P.M.

FRANCIS W. GOSS,

Recording Secretary.

June 11, 1895.

The Annual Meeting of the Councillors was held in the hall of the Medical Library Association, No. 19 Boylston Place, Boston, on Tuesday, June 11, 1895, at 7 o'clock, P.M.

The President, Dr. Frank K. Paddock, in the chair.

The following Councillors were present:

Barnstable.
B. D. Gifford.

Berkshire.
J. F. A. Adams,
W. W. Leavitt,
F. K. Paddock,
W. W. Scofield.

Bristol North.
H. B. Baker,
W. S. Robinson.

Bristol South.
J. H. Gifford,
J. Gilbert,
J. H. Jackson,
G. DeN. Hough,
J. J. B. Vermyne,
E. M. Whitney.

Essex North.
H. G. Leslie.

Essex South.
J. Allen,
D. Coggin,
J. W. Goodell,
G. E. Macarthy,
C. E. Meader.

Franklin.
A. C. Walker.

Hampshire.
H. B. Perry,
C. Seymour,
J. Yale.

Middlesex East.
F. W. Graves,
J. M. Harlow.

Middlesex North.
J. A. Gage,
W. B. Jackson,
J. B. Wentworth.

Middlesex South.
D. E. Baker,
R. A. Blood,
C. H. Cook,
J. G. Dearborn,
W. Ela,
E. Farnham,
A. G. Griffin,
E. G. Hoitt,
E. D. Hooker,
J. E. Marsh,
H. E. Marion,
G. N. P. Mead,
J. A. Mead,
J. T. G. Nichols,
A. L. Norris,
E. H. Stevens,
L. R. Stone,
J. O. Tilton,
H. P. Walcott,
A. C. Webber,
H. C. White,
M. Wyman.

Norfolk.
E. H. Baxter,
A. W. Blair,
C. A. Cheever,
A. B. Coffin,
S. M. Crawford,
S. Crowell,
G. H. Francis,
T. Garceau,
J. S. Greene,
W. B. Lancaster,
J. P. Maynard,
A. P. Perry,
M. V. Pierce,
L. H. Plimpton,
O. F. Rogers,
I. W. Starbird,
H. R. Stedman,
G. B. Stevens,
H. W. White.

Norfolk South.
J. H. Gilbert,
J. A. Gordon.

Plymouth.
J. B. Brewster,
H. W. Dudley,

A. E. Paine,
F. G. Wheatley.

Suffolk.

S. L. Abbot,
J. B. Ayer,
H. J. Barnes,
J. G. Blake,
A. N. Blodgett,
E. H. Brigham,
F. H. Brown,
E. M. Buckingham,
W. N. Bullard,
F. E. Bundy,
J. F. Bush,
A. T. Cabot,
B. F. Campbell,
J. R. Chadwick,
D. W. Cheever,
E. G. Cutler,
F. W. Draper,
R. D. Elliott,
R. H. Fitz,
E. J. Forster,
M. F. Gavin,
G. W. Gay,
A. R. Hahn,
W. H. H. Hastings,
W. C. Holyoke,
G. F. Jelly,
F. I. Knight,
A. L. Mason,
J. H. McCollom,
J. J. Minot,
A. B. Morong,
C. B. Porter,
A. Post,
J. J. Putnam,
J. M. Putnam,
M. H. Richardson,
W. L. Richardson,
T. M. Rotch,
G. H. M. Rowe,
F. C. Shattuck,
A. D. Sinclair,
A. M. Sumner,
C. W. Swan,
J. B. Swift,
G. G. Tarbell,
H. F. Vickery,
S. G. Webber,
J. C. White,
E. N. Whittier.

Worcester.

F. W. Brigham,
W. Davis,
T. H. Gage,
E. B. Harvey,
S. P. Holbrook,
E. R. Wheeler,
L. Wheeler,
A. Wood.

Worcester North.

R. F. Andrews,
E. J. Cutter,
B. H. Hartwell,
J. W. Stimson,
F. H. Thompson.

Total, 137.

The record of the previous meeting was read and accepted.

The Secretary read the names of new and of deceased Fellows.

The Treasurer, Dr. Forster, read his annual report.

The Auditing Committee reported that they found the Treasurer's accounts correctly cast and properly vouched, and that he has in his possession the various securities and funds called for.

The Treasurer's report was then accepted.

The Committee on Membership and Finances reported through Dr. Draper and recommended that $2500.00 of the surplus in the treasury be distributed among the District Societies.

The recommendation of the Committee was adopted.

On recommendation of the same Committee, it was voted that the following be allowed to resign:

Arthur Everett Austin, of Dorchester.
Henry Barton Jacobs, of Baltimore, Md.
Harriet Eliza Parker, of Greenfield.
Adeline Stearns Whitney, of Lexington.

Also, that the following be allowed to retire:

Albert Henry Blanchard, of Sherborn.
Ebenezer Alexander Deane, of Montague.
Josiah Hamilton Goddard, of Orange.
Isaiah Hutchins, of West Acton.
John Parker Maynard, of Dedham.
Adin Hubbard Newton, of Everett.
Austin Wilbur Sidney, of Fitchburg.

Also, that the names of the following be dropped from the roll of Fellows for three or more years' delinquency in the payment of assessment dues:

William Henry Danforth, of Troy, N. Y.
Frank Stanley Hamlett.
John Remington Hobbin, of North Adams.
George Draper Kelley, of Lexington, Ky.
George Washington Lawrence, of Cromwell, Conn.
William Martin Ogden, of Tropico, Cal.
James O'Ready, of Millbank, So. Dakota.
George Elmer Porter.
Ida May Porter, of Rochester, N. Y.
John Edward Ray, of New York, N. Y.
Alice Rogers, of Media, Penn.

Voted, that the following be restored to Fellowship:

Theodore Osgood Cornish, of South Boston.
William Edward Faulkner, of Keene, N. H.
Eliza Bogart Lawrence Norton, of Norwood.
Joseph Cummings Yale, of North Cambridge.

The Committee on Publications presented its report.

The Librarian, Dr. Brigham, presented his report.

The Committee on Nominations reported a list of candidates for the offices of the Society for the ensuing year, and the same were elected by ballot:

President . .	Dr. FRANKLIN K. PADDOCK, of Pittsfield.
Vice-President .	Dr. A. MARTIN PIERCE, of New Bedford.
Treasurer . .	Dr. EDWARD J. FORSTER, of Boston.
Corresponding Sec'y	Dr. CHARLES W. SWAN, of Boston.
Recording Secretary	Dr. FRANCIS W. GOSS, of Roxbury.
Librarian . .	Dr. EDWIN H. BRIGHAM, of Boston.

Dr. HENRY P. BOWDITCH, of Boston, was chosen Orator for the Annual Meeting of the Society in 1896.

Voted, That the next Annual Meeting of the Society be held in Boston, on the second Wednesday in June, 1896.

Voted, That the Annual Meeting of the Supervisors be held in Boston, on the first Wednesday in October, 1895.

On nomination by the President, the following Standing Committees were appointed:

Of Arrangements.

A. Thorndike, J. G. Mumford, P. Thorndike,
A. K. Stone, M. V. Pierce, J. E. Goldthwait.

On Publications.

B. E. Cotting, O. F. Wadsworth, G. B. Shattuck.

On Membership and Finances.

F. W. Draper, J. Stedman, E. G. Cutler,
L. R. Stone, A. H. Johnson.

To Procure Scientific Papers.

H. P. Bowditch, H. L. Burrell, L. Wheeler,
F. H. Zabriskie, S. B. Woodward, C. W. Townsend.

On Ethics and Discipline.

G. E. Francis, F. C. Shattuck, C. G. Carleton,
E. Cowles, J. F. A. Adams.

On Medical Diplomas.

E. J. Forster, H. E. Marion, E. N. Whittier.

On State and National Legislation.

F. K. Paddock, H. P. Walcott, H. P. Bowditch,
T. H. Gage, S. D. Presbrey.

Dr. Forster moved, and it was voted, that a Committee of five be appointed by the chair to examine and report upon the Digest, and also to consider what changes, if any, are necessary that the By-Laws conform to the existing Statutes.

The following were appointed to constitute the Committee :

Drs. E. B. Harvey, E. J. Forster, G. E. Francis, W. L. Richardson and F. W. Goss.

Adjourned at 8.50 P.M.

FRANCIS W. GOSS,

Recording Secretary.

Massachusetts Medical Society.

PROCEEDINGS OF THE SOCIETY.

ADJOURNED MEETING.

OCTOBER 3, 1894.

THE Society met, pursuant to adjournment, at 1 o'clock P.M., on Wednesday, October 3, 1894, in the hall of the Medical Library Association, No. 19 Boylston Place, Boston.

The President, Dr. FRANK K. PADDOCK, in the chair.

Voted, That the Society concur with the Council in the amendments to By-Laws I., XIII., XIX., XX., XXI., passed by the Councillors February 7, 1894.—(Vide Proceedings, pp. 38–40.). Also to By-Law XIX., passed by the Councillors June 12, 1894.—(Vide Proceedings, p. 46.). Also to By-Laws VI. and VII., passed by the Councillors October 3, 1894.—(Vide Proceedings, p. 69.).

In accordance with notice given at the annual meeting, the following amendments to the Rules and Orders of the Society, then proposed, were adopted:

In Rule 13, substitute the word "President" for the words "Anniversary Chairman."

In Rule 14, omit the words "or Anniversary Chairman."

The sentence of the Board of Trial in the case of Dr. C. H. Darling was confirmed, and it was

Voted, That Cassius Harriot Darling be and is expelled from his membership of the Massachusetts Medical Society.

Adjourned.

FRANCIS W. GOSS,

Recording Secretary.

ANNUAL MEETING.

First Day.

June 11, 1895.

The Shattuck Lecture was given by Dr. Robert T. Edes, of Jamaica Plain, at 1 o'clock P.M., June 11, 1895, in the building of the Massachusetts Charitable Mechanic Association, Boston.

Sectional meetings were held at 2.30 o'clock P.M.

The sections were organized and papers were presented as follows:

SECTION IN MEDICINE.

Dr. F. W. Chapin, of Springfield . . . Chairman.
Dr. G. G. Sears, of Boston . . . . . Secretary.

Modern Views of the Nature and Treatment of Exophthalmic Goitre.—By Dr. J. J. Putnam, of Boston.

Discussion by Dr. G. B. Shattuck, of Boston.

The Diagnosis of Malaria from the Presence of Parasites in the Blood.—By Philip Kilroy, of Springfield.

Discussion by Dr. F. H. Williams, of Boston.

SECTION IN SURGERY.

Dr. J. B. Brewster, of Plymouth . . . Chairman.
Dr. C. L. Scudder, of Boston . . . . Secretary.

Recent Progress in Genito-Urinary Surgery. Treatment of Enlarged Prostate.—By Drs. A. T. Cabot, F. S. Watson, of Boston.

Discussion by Drs. L. Bolton Bangs, E. L. Keyes, of New York City; Abner Post, G. W. Allen, of Boston.

FRANCIS W. GOSS,

Recording Secretary.

Second Day.

June 12, 1895.

The Society met in Mechanic Building, Boston, on Wednesday, June 12, 1895, at 9 o'clock, A.M., for the exercises of the one hundred and fourteenth Anniversary.

The President, Dr. Frank K. Paddock, in the chair.

The records of the last annual meeting and of the subsequent adjourned meeting were read and accepted.

The Secretary presented the names of Fellows reported admitted since the last annual meeting, and of Fellows whose deaths had been recorded.

Admissions reported since June 12, 1894.

1894	Adams, Charles Sumner	Wollaston.
1894	Albee, George Macdonald	Worcester.
1895	Aronovitch, Anna	Jamaica Plain.
1894	Auger, Louis Lemaître	Worcester.
1894	Bailey, Marshall Henry	Boston.
1895	Barré, Joseph Aladin	Fall River.
1895	Bartlett, Clarence Samuel	Gardner.
1895	Bartlett, Oliver Leslie	Brockton.
1895	Bateman, Frank Elliot	Boston.
1894	Bennett, Frederick Sherwin	Boston.
1894	Bertram, William Henry	East Boston.
1894	Birge, Ella Freeman	Provincetown.
1894	Bowles, George Hall	Boston.
1894	Bragg, Frank Adelbert	Boston.
1895	Bump, Lewis Nye	Somerville.
1894	Burnham, Elmond Arthur	Boston.
1894	Calkins, Cheney Hosmer	Springfield.
1894	Capps, Joseph Almarin	Somerville.
1894	Chamberlain, George Washington	Springfield.
1895	Chicoine, Isidore Hermanigilde	Lynn.
1894	Cogswell, Charles Frederick	Brookline.
1895	Conroy, Peter John	Everett.
1895	Coues, William Pearce	Boston.
1894	Cowan, John Rice	Boston.
1895	Damon, Arthur Llewellyn	Wilbraham.
1894	Davenport, Charles Albert	Worcester.
1894	Deans, Herbert Clair	Boston.

1895	Dembo, Fanny	Jamaica Plain.
1895	Denig, Blanche Alpine	Boston.
1894	Dohoghue, Francis Dennis	Boston.
1895	Downey, Charles John	Mittineague.
1894	Dudley, Augustus William	Boston.
1894	Dunham, Henry Bristol	Roxbury.
1895	Dunn, Charles Stein	Haverhill.
1895	Eastman, Charles Albert	Lowell.
1895	Ela, Paul Francis	Cambridgeport.
1894	Fillebrown, Thomas	Roxbury.
1894	Fitzsimmons, Philip Mansfield	East Cambridge.
1895	Flewelling, Douglass Scovil	Somerville.
1894	Foley, Timothy John	Worcester.
1895	Fox, Charles Leonard	Lowell.
1894	Fox, Horace	Jamaica Plain.
1894	Frothingham, Charles Benjamin	Peabody.
1894	Fuller, Frederick Henry	Fall River.
1895	Greene, Thomas Francis	Roxbury.
1894	Gobron, Louis Constant	Boston.
1895	Greenleaf, George Walter	Somerville.
1894	Groll, Edward Wright	Boston.
1895	Hall, Milton Wilder	Roxbury.
1894	Hall, Newbert Jackson	Brookline.
1893	Harmon, Melvin Augustus	Lynn.
1895	Hayes, Irving Benjamin	Florence.
1894	Henshaw, George Bridges	Cambridge.
1894	Hibbard, Cleon Melville	Boston.
1894	Higgins, James Haydn	Marston's Mills.
1895	Hills, Frederick Lyman	Danvers.
1895	Hitchcock, John Sawyer	Northampton.
1894	Hodges, Almon Danforth	Roxbury.
1894	Holbrook, George	Springfield.
1895	Hutchinson, Charles Martin	Boston.
1894	Irwine, William Herbert	Newburyport.
1894	Jewett, Walter Kendall	Fitchburg.
1895	Jones, Claude Perry	Chelsea.
1894	Joslin, Elliott Proctor	Boston.
1894	Joyce, Charles Pitt Fid	Boston.
1894	Kenney, Franklin Woodbury	Lynn.
1894	Keown, James Archibald	Lynn.
1894	Lane, Francis Augustus	Boston.
1894	Leach, Edward Morton	Rochdale.
1895	Leard, John Samuel Hick	Jamaica Plain.
1892	Learoyd, Charles Berry	Danvers.
1893	Libby, Jesse Herbert	Boston.
1894	Lincoln, Charles Stuart Fessenden	Salem.
1895	Lovell, Charles Dixon Smith	Lynn.

1894	Lovell, David Bigelow	Worcester.
1895	McConnell, Hugh Beemer	Lowell.
1894	McEvoy, Thomas Edward	Worcester.
1895	Mehegan, Daniel Joseph	Taunton.
1894	Mehrenlender, Albert Nochim	Boston.
1894	Meigs, Jonathan Harding	Revere.
1894	Meigs, Return Jonathan	Lowell.
1894	Mercer, William James	Pittsfield.
1894	Moore, William Morrison	Provincetown.
1895	Morgan, Lewis Edson	Needham.
1895	Murphy, Emily Frances	Taunton.
1894	Murphy, John McKonkey	Malden.
1895	Nelson, Lois Everett	Worcester.
1895	Noble, Anngenette Fowler	Westfield.
1894	Ott, George John	Clinton.
1894	Page, Calvin Gates	Boston.
1894	Parker, Frank Howard	Malden.
1895	Peck, Albert Fred	Woburn.
1895	Peckham, Katherine Fenner	Boston.
1895	Pedrick, Stephen Augustus	Boston.
1895	Piper, Frank	Boston.
1894	Procter, Percy Clement	Dorchester.
1894	Putnam, Willard Abram	Cambridgeport.
1894	Rabinovich, Helen	Boston.
1895	Richmond, Ernest Dalton	Deerfield.
1894	Roberts, Henry Ambrose	Boston.
1895	Robey, William Henry, Jr.	Dorchester.
1895	Robinson, William Perry	Haverhill.
1895	Rovinsky, Alexander	Boston.
1894	St. Dennis, Joseph Nelson	Medford.
1895	Sargent, Albert Alonzo	Lowell.
1895	Scoboria, Arthur Gilmore	Boston.
1894	Shannon, Nat Vaughn	Cambridge.
1895	Shay, Thomas Maguire	Roxbury.
1895	Shea, Thomas Bernard	Roxbury.
1894	Sherman, Mary Hastings	Brookfield.
1894	Shores, Harvey Towle	Springfield.
1894	Smith, Fred Simpson	Boston.
1894	Smith, Thomas Burke	Lowell.
1894	Smithwick, Marsena Parker	Boston.
1895	Steadman, John Abraham	Canton.
1894	Stevens, Charles Benjamin	Worcester.
1894	Stokes, William Royal	Boston.
1894	Stone, Ella Gertrude	Lawrence.
1894	Stone, James Savage	Boston.
1895	Sullivan, James Stephen	Melrose.
1894	Sullivan, John Henry	Worcester.

1894	Tenney, William Northend	Boston.
1895	Thompson, Harry John	Wrentham.
1894	Treanor, John Peter	Boston.
1894	Trecartin, David Munson	Tewksbury.
1895	Van Rensselaer, Henry R.	Lanesboro'.
1895	Varney, Fred Elbridge	North Chelmsford.
1894	Watts, Henry Fowler Ransford	South Boston.
1894	Weiser, Walter Rupert	Springfield.
1895	Weller, Francis Joseph	Boston.
1894	West, George Leon	Newton Centre.
1894	Wheeler, Charles Douglas	Worcester.
1894	Williams, Edward Russell	Boston.
1894	Williams, Frank Percival	Boston.
1894	Wilson, Fred Newhall	Boston.
1894	Wright, Charles Silas	Boston.
1895	Young, Edgar William	Everett.

Total, 137.

List of Deceased Fellows.

Admitted.	Name.	Residence.	Date of Death.	Age.
1834	Bemis, Jonathan Wheeler	Cambridge	Jan. 6, 1895	84
1871	Blodgett, Frank Marcellus	New York, N.Y.	Sept. 26, 1894	58
1863	Bowles, Stephen Wallace	Springfield	Feb. 12, 1895	59
1881	Bradt, Gerritt James	Lowell	July 2, 1894	41
1878	Brown, Wesley Everett	Gilbertville	July 30, 1894	42
1845	Cornell, William Mason	Boston	April 14, 1895	94
1870	Davis, George Washington	Holyoke	Sept. 18, 1894	47
1872	Fisk, Cyrus Mentor	Lowell	Jan. 21, 1895	70
1878	Flagg, Urbane Hallock	Mittineague	Nov. 28, 1894	43
1876	Forsyth, Frank Lyman	Providence, R.I.	May 11, 1895	41
1839	French, Nathan	Malden	April 27, 1895	84
1850	Greely, Moses Reuben	So. Weymouth.	April 23, 1895	68
1846	Hagar, Joseph	E. Marshfield	April 9, 1895	75
1878	Hamilton, Albinus Otis	Dorchester	Oct. 4, 1894	61
1842	Harris, Jonas Cowdry	Arlington	Feb. 10, 1895	75
1854	Holmes, Alexander Reed	Canton	Nov. 11, 1894	68
1836	Holmes, Oliver Wendell	Boston	Oct. 7, 1894	85
1868	Huckins, David Thompson	Watertown	July 21, 1894	75
1847	Jewett, George	Fitchburg	Dec. 16, 1894	69
1840	Mack, William	Salem	June 9, 1895	80
1853	Manning, Joseph	Rockport	Dec. 10, 1894	70
1855	Miner, David Worthington	Ware	Jan. 3, 1895	74
1851	Perkins, George Augustus	Salem	May 18, 1895	82
1844	Pillsbury, Levi	Fitchburg	Feb. 4, 1895	77
1856	Sawyer, Frederick Augustus	Wareham	Feb. 10, 1895	62
1879	Smith, Henry Sutton Burgess	Middleboro'	Oct. 30, 1894	55
1876	Spalding, Charles Parker	Lowell	March 26, 1895	48
1870	Talbot, Charles Carroll	Lawrence	Aug. 4, 1894	51
1849	Townsend, George James	So. Natick	Dec. 9, 1894	71
1843	Tucker, Elisha Gustavus	Boston	May 18, 1895	86

1864	Walker, James Edwin	Brookline	June	15, 1894	62
1881	Watson, Barron Crowell	Centre Marshf'd	Oct.	30, 1894	70
1871	Webber, George Clark	Millbury	June	11, 1895	57
1889	Whittemore, Frank Stowell	Boston	Nov.	24, 1894	30
1874	Young, George Sayward	Stoughton	May	16, 1895	43
1851	Youngman, David	Boston	May	11, 1895	77

Total, 36

The Treasurer, Dr. Forster, presented his annual report.

Voted, That when the Society adjourns it be to 1 P.M., on the first Wednesday in October, 1895, at the place where the Councillors shall meet on that day, to act on amendments to the By-Laws and any other matters that may legally come before the Society.

A communication from the Middlesex South District Medical Society, calling the attention of the Massachusetts Medical Society to the condition of instruction in physiology and hygiene in the public schools of the State, was read.

It contained the suggestion that a Committee be appointed to consider the subject.

Voted, To acceed to the above request.

Voted, That the following constitute the Committee: Drs. H. P. Bowditch, A. H. Johnson, G. W. Fitz.

Dr. Bullard, for the Committee appointed in 1891 to advocate before the Legislature that proper provision be made for the care and treatment of chronic adult epileptics, reported that a bill has been passed by the General Court providing for a State hospital for chronic epileptics.

From 9.30 to 10 A.M. an interesting drill was given by a detail from the ambulance corps of the Massachusetts Volunteer Militia.

At 10 A.M. the reading of papers was begun as follows:

ANTITOXIN IN DIPHTHERIA.

THE ETIOLOGY OF DIPHTHERIA AND THE USE OF ANTITOXIN —By Dr. H. C. Ernst, of Boston.

THE PATHOLOGY OF DIPHTHERIA.—By Dr. W. T. Councilman, of Boston.

THE PROPHYLACTIC USE OF ANTITOXIN.—By Dr. F. G. Morrill, of Boston.

THE PREPARATION OF DIPHTHERIA ANTITOXIN.—By Dr. J. L. Goodale, of Boston.

THE CLINICAL USE OF ANTITOXIN.—By Dr. W. H. Park, of New York City.

Discussion by Drs. C. F. Withington, of Roxbury; G. G. Sears, of Boston.

The following delegates from other State Medical Societies were present:

Maine.—Drs. C. D. Smith, Charles Hutchinson.

New Hampshire.—Drs. F. E. Kiddredge, I. G. Anthoine, M. E. Kean.

Vermont.—Dr. C. F. Camp.

Rhode Island.—Drs. G. F. Keen, C. M. Godding.

Connecticut.—Dr. J. E. Root.

New York Association.—Dr. Robert Newman.

At 12 o'clock the Annual Discourse was delivered by Dr. ALFRED WORCESTER, of Waltham.

Voted, That the thanks of the Society be presented to Dr. Worcester for his able, interesting and inspiring address.

At 1 P.M., the Annual Dinner, presided over by the Anniversary Chairman, Dr. Herbert L. Burrell, was served to nine hundred and fifty Fellows and invited guests.

FRANCIS W. GOSS,
Recording Secretary.

TREASURER'S REPORT.

THE Treasurer presents the following report for the year ending 15 April, 1895.

The invested funds are as follows:

The Permanent Fund		$11,253 30
The Shattuck Fund		9,166 87
The Phillips Fund		10,000 00
The Cotting Fund		3,000 00
		$33,420 17

The balance on hand of cash at the beginning of the year was		$2,992 83
The Receipts have been:—		
Excess on sale of £1. 1. order		04
Assessments paid direct to the Treasurer		1,925 00
Assessments paid to District Treasurers:		
Barnstable	$115 00	
Berkshire	200 00	
Bristol North	145 00	
Bristol South	270 00	
Essex North	350 00	
Essex South	500 00	
Franklin	105 00	
Hampden	255 00	
Hampshire	190 00	
Middlesex East	120 00	
Middlesex North	435 00	
Middlesex South	1,005 00	
Norfolk	855 00	
Norfolk South	135 00	
Plymouth	160 00	
Suffolk	1,525 00	
Worcester	590 00	
Worcester North	160 00	
		7,115 00
Income:		
Permanent Fund	$450 12	
Shattuck Fund	366 67	
Phillips Fund	400 00	
Cotting Fund	254 90	
Interest on cash balance	125 40	
		1,597 09
Censors' fine for absence		5 00
Sale of Diplomas		15 00
Sale of extra dinner tickets		10 00
Making a total of		$13,659 96

The Expenses have been:		
The Annual Meeting and Dinner:		
Carriages	$4 00	
Advertising	1 63	
Rent of hall	375 00	
Signs	4 25	
Ticket takers, police, janitor, ice, etc.	24 50	
Printing, postage, and stationery	26 12	
Stenographers	40 00	
Music	50 00	
Caterer	1,720 00	
Cigars	97 75	
Badges	3 00	
Anniversary Chairman, expenses	3 20	
		$2,349 45
Salaries in full to 15 April, 1895		1,050 00
Treasurer's expense:		
Printing, postage and stationery		182 44
Recording Secretary's expense:		
Printing, postage and stationery		144 53
Librarian's expense, and as Custodian of Records:		
Printing, postage, stationery and express		429 28
District Treasurers' expense:		
Commissions and incidentals		404 61
Censors' expense:		
Fees, advertising and stationery		508 00
Board of Trial, expenses		30 30
Committee on Publications:		
By-Laws	$67 82	
Communications and Transactions	630 24	
The Shattuck Lecturer	200 00	
		898 06
Committee on Diplomas, expenses		71 25
The Cotting Lunch for Councillors		123 00
Annual Rent		150 00
Dividend distributed to the District Societies		1,900 00
Sundry expenses for Catalogue		837 61
Sundry expenses, advertising, etc.		25 00
Making the total expenses,		$9,103 53
Leaving a balance on hand of		$4,556 43
This balance is distributed as follows:		
Unexpended income of Shattuck Fund		715 16
Unexpended income of Cotting Fund		139 17
Unexpended general income		3,702 10
		$4,556 43

Dr.	Trial Balance—15 April, 1895.	Cr.
Cash	$4,556 43	
Permanent Fund Investment	11,253 30	
Shattuck Fund Investment	9,166 87	
Cotting Fund Investment	3,000 00	
Phillips Fund Investment	10,000 00	
Mass. Hosp. Life Ins. Co.	20,420 17	
Provident Ins. Savings	1,000 00	
Suffolk Savings Bank	1,000 00	
Roxbury Ins. for Savings	1,000 00	
U. S. 4% Bonds	10,000 00	
	$71,396 77	
Property		$33,420 17
Permanent Fund		11,253 30
Shattuck Fund		9,166 87
Cotting Fund		3,000 00
Phillips Fund		10,000 00
Shattuck Fund Income		715 16
Cotting Fund Income		139 17
Profit and loss		3,702 10
		$71,396 77

All of which is respectfully submitted.

EDWARD JACOB FORSTER,

Boston, 11 June, 1895. *Treasurer.*

Boston, June 8th, 1895.

The undersigned, a duly appointed Auditing Committee, having examined the books of the Treasurer, find them correctly cast and properly vouched; and also find that he has the various securities and funds called for in his possession

A. D. SINCLAIR,
WALTER ELA, } *Committee.*

Officers of the Massachusetts Medical Society.

1895—1896.

Chosen June 11, 1895.

FRANKLIN K. PADDOCK, Pittsfield, . President.
A. MARTIN PIERCE, . . New Bedford, Vice-President.
EDWARD J. FORSTER, . Boston, . . Treasurer.
CHARLES W. SWAN, . . Boston, . . Cor. Secretary.
FRANCIS W. GOSS, . . . Roxbury, . Rec. Secretary.
EDWIN H. BRIGHAM, . . Boston, . . Librarian.

Standing Committees.

Of Arrangements.

A. Thorndike, J. G. Mumford, P. Thorndike,
A. K. Stone, M. V. Pierce, J. E. Goldthwait.

On Publications.

B. E. Cotting, O. F. Wadsworth, G. B. Shattuck.

On Membership and Finances.

F. W. Draper, J. Stedman, E. G. Cutler,
L. R. Stone, A. H. Johnson.

To Procure Scientific Papers.

H. P. Bowditch, H. L. Burrell, L. Wheeler,
F. H. Zabriskie, S. B. Woodward, C. W. Townsend.

On Ethics and Discipline.

G. E. Francis, F. C. Shattuck, C. G. Carleton,
E. Cowles, J. F. A. Adams.

On Medical Diplomas.

E. J. Forster, H. E. Marion, E. N. Whittier.

On State and National Legislation.

F. K. Paddock, H. P. Walcott, H. P. Bowditch,
T. H. Gage, S. D. Presbrey.

Presidents of District Societies—Vice-Presidents (Ex-Officiis).

(Arranged according to Seniority.)

O. Warren,
J. G. Blake,
T. H. Dearing,
A. S. Deane,
D. D. Gilbert,
H. E. Marion,
C. W. Page,
L. Wheeler,
L. G. Chandler,
J. C. Irish,
A. M. Pierce,
J. E. Bacon,
D. March, Jr.,
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E. E. Maryott,
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